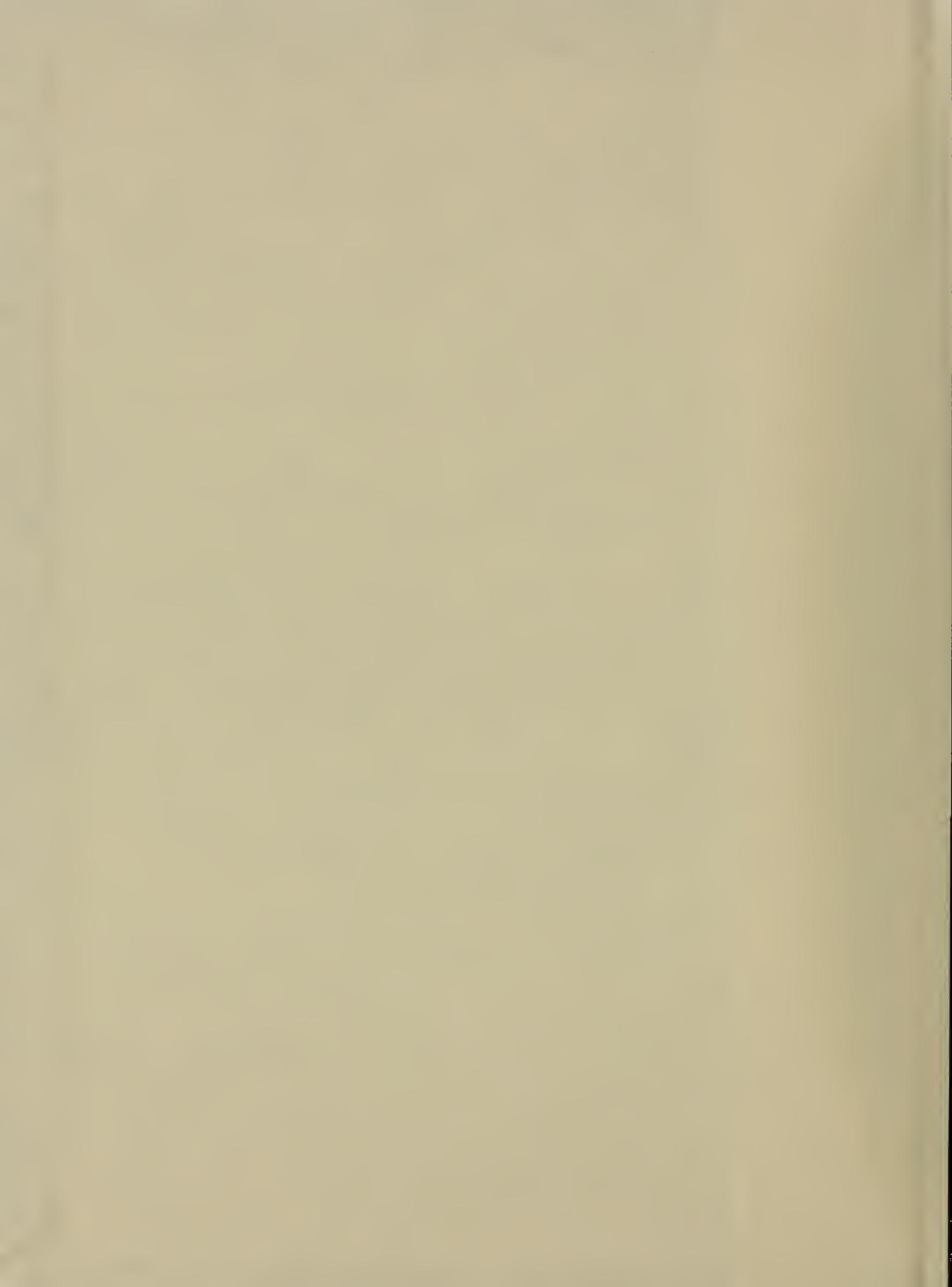
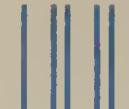


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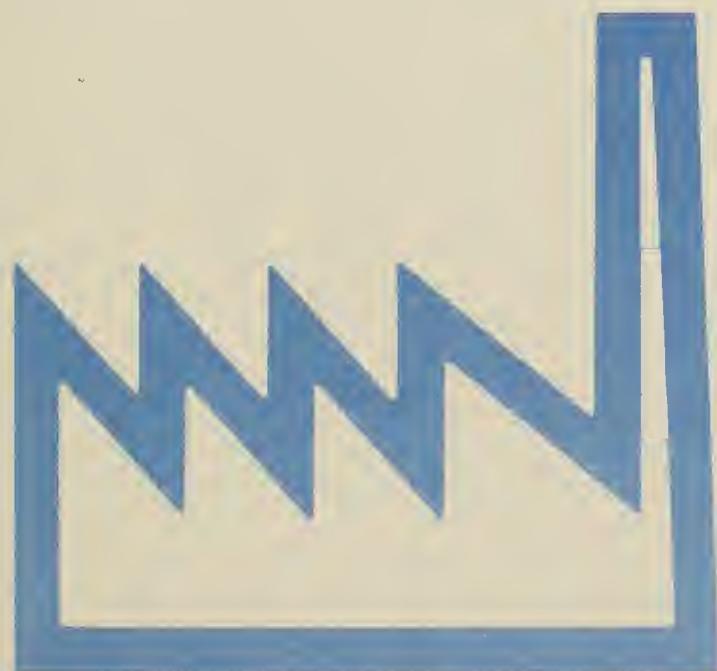
Census of Manufactures

MC82-I-33B

INDUSTRY SERIES

Ferrous and Nonferrous Foundries

Industries 3321, 3322, 3324, 3325, 3361, 3362, and 3369



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The publications
from the 1982 Economic and
Agriculture Censuses are dedicated
to the memory of Shirley Kallek,
Associate Director for Economic Fields.
During her career at the Bureau of the
Census (1955 to 1983), she continually
directed efforts to improve
the timeliness and accuracy of
economic statistics.

1982 Census of Manufactures

MC82-I-33B

INDUSTRY SERIES

Ferrous and Nonferrous Foundries

3321	Gray Iron Foundries
3322	Malleable Iron Foundries
3324	Steel Investment Foundries
3325	Steel Foundries, N.E.C.
3361	Aluminum Foundries
3362	Brass, Bronze, and Copper Foundries
3369	Nonferrous Foundries, N.E.C.

Issued February 1985



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Economic and Agriculture Censuses

INDUSTRY DIVISION

Gaylord E. Worden, Chief

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INTRODUCTION

ECONOMIC CENSUSES OVER TIME

The early beginnings of America's industrial output were first measured in the United States in the 1810 Decennial Census and again in 1820, when questions on manufacturing were included with those for population. Beginning with the 1840 Decennial Census, there were enumerations of manufactures and mineral industries at 10-year intervals up to and including the year 1900 for manufactures and 1940 for mineral industries. The latter census was again taken for 1954, 1958, 1963, and 1967.

Because of the increasing dominance of manufacturing in the early 20th century, Congress directed that quinquennial censuses of manufactures be taken beginning in 1905. However, from 1919 through 1939, these censuses were conducted every 2 years. The need for war-related current surveys in the early 1940's postponed the next census of manufactures until 1948 (for 1947). That census was again taken for 1954, 1958, 1963, and 1967.

Retail and wholesale trade data were first collected in 1930, and in 1933 information on selected service industries was added to the data-collection operation. These business censuses, as they were called, were again taken for 1935, 1939 (as part of the 1940 decennial program), 1948, 1954, 1958, 1963, and 1967.

Information on construction industries was obtained first in 1930 and again for 1935 and 1939. Data for the full spectrum of construction industries were not gathered again until 1968 (for 1967).

The need for transportation data to supplement information available from existing governmental or private sources was recognized by Congress in the late 1950's and early 1960's. The census of transportation (consisting of several surveys) was taken first for 1963 and again for 1967.

Since 1967, all of the above censuses have been taken quinquennially as part of the Census Bureau's economic census program. (For the 1977 censuses, the coverage of the service industries was broadened from "selected services" to "all services, except religious organizations and private households." A total of 41 additional four-digit standard industrial classifications¹ (SIC's) in 7 SIC major groups was added to the scope of the census. While most of the industries included for the first time for 1977 were covered again for 1982, some were not, i.e., hospitals; elementary and secondary schools; colleges, universities, and professional schools; junior colleges and technical institutes; labor unions and similar labor organizations; and political organizations.)

The first manufacturing census for an outlying area was conducted in Puerto Rico for the year 1909. Thereafter, with the exception of 1929, a census was taken at 10-year intervals through 1949. The first censuses of retail trade, wholesale trade, and selected service industries in Puerto Rico were conducted for 1939. These censuses also were taken for the years 1949, 1954, 1958, 1963, and 1967. A census of construction industries was introduced first in Puerto Rico for 1967. These censuses of Puerto Rico have been taken since then for the years 1972, 1977, and 1982.

Censuses of manufactures, retail trade, wholesale trade, and selected service industries were conducted in Guam and the

Virgin Islands of the United States for 1958, 1963, 1967, 1972, 1977, and 1982. Censuses of mineral industries were taken in the Virgin Islands of the United States for the years 1958, 1963, and 1967 but not since that time. A census of construction industries was also undertaken in these areas for 1972, 1977, and 1982.

Retail trade, wholesale trade, selected service industries, manufacturing, and construction industries were canvassed for the first time in the Northern Mariana Islands in 1983 (for 1982).

For 1982, the economic censuses and agriculture censuses were conducted concurrently.

USES OF THE ECONOMIC CENSUSES

The economic censuses are the major source for facts about the structure and functioning of the Nation's economy and provide essential information for government, business, industry, and the general public. They provide an important part of the framework for such composite measures as the gross national product, input-output measures, indexes of industrial production, and indexes measuring productivity and price levels. Information from the censuses is used to establish sampling frames and as benchmarks for current surveys of business activity, which are essential for measuring short-term economic conditions.

State and local governments use census data to assess business activities within their jurisdictions. The private sector uses the data to forecast general economic conditions; analyze sales performance; lay out sales territories; allocate funds for advertising; decide on locations for new plants, warehouses, or stores; and measure potential markets in terms of size, geographic areas, kinds of business, and kinds of products made or sold.

Following every census, thousands of businesses and other users purchase reports. Likewise, census facts are disseminated widely by trade associations, business journals, and newspapers. Volumes containing census statistics are available in most major public and college libraries. All 1982 data are available on microfiche from the U.S. Government Printing Office and most data on computer tape from the Census Bureau. Finally, the more than 50 State Data Centers also are suppliers of economic census statistics.

AUTHORITY AND SCOPE OF THE ECONOMIC CENSUSES

The economic censuses are required by law under title 13 of the United States Code, sections 131, 191, and 224, which directs that they be taken at 5-year intervals for the years ending in 2 and 7. The 1982 Economic Censuses covered manufacturing, mining, construction industries, retail trade, wholesale trade, service industries, and selected transportation activities. Special programs also cover minority-owned and women-owned businesses. The next economic censuses are scheduled to be taken in 1988 for the year 1987.

¹Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.

CENSUS OF MANUFACTURES

General

The 1982 Census of Manufactures is the 31st census of manufactures of the United States. For 1982, it was conducted jointly with the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses.

This report, from the 1982 Census of Manufactures, is one of a series of 82 industry reports, each of which provides statistics for groups of related industries. Additional separate reports will be issued for each State and on special subjects, such as size of establishments, legal form of organization, and fuels and electric energy consumed.

These separate reports will subsequently be issued as portions of the final census volumes. Volume I, Subject Statistics, will show comparative statistics for industries, States, and standard metropolitan statistical areas. It also will show selected subjects, such as concentration ratios in manufacturing, selected materials consumed, manufacturing activity in government establishments, and water use in manufacturing. Volume II, Industry Statistics, will be a consolidation of reports for the 82 groups of industries showing the same information that is shown in this report. Volume III, Geographic Area Statistics, will contain establishment-based data (number of establishments, employment, payroll, value added by manufacture, and capital expenditures) for each State and its important standard metropolitan statistical areas, counties, and places, by industry groups and important individual industries. Totals for "all manufacturing" will be shown for counties and places with more than 450 manufacturing employees. The introduction to the final volumes will discuss, at greater length, many of the subjects described in this introduction. For example, the volume text will discuss the relationship of value added by manufacture to National income by industry of origin, the changes in statistical concepts over the history of the censuses, and the valuation problems arising from intracompany transfers between manufacturing plants of a company and between manufacturing plants and sales offices and sales branches of a company.

Scope of Census and Definition of Manufacturing Industries

The 1982 Census of Manufactures covers all establishments employing one person or more primarily engaged in manufacturing as defined in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 Supplement.¹ This is the system of industrial classification developed over a period of years by experts on classification in government and private industry under the guidance of the Office of Management and Budget. This system of classification is in general use among government agencies as well as organizations outside the government.

The SIC manual defines manufacturing as the mechanical or chemical transformation of inorganic or organic substances into new products. The assembly of component parts of products is also considered to be manufacturing if the resulting product is neither a structure nor other fixed improvement. These activities are usually carried on in plants, factories, or mills that characteristically use power-driven machines and materials handling equipment.

¹Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.

IV INTRODUCTION

Manufacturing production is usually carried on for the wholesale market, for transfers to other plants of the same company, or to the order of industrial users rather than for direct sale to the household consumer. Some manufacturers in a few industries sell chiefly at retail to household consumers through the mail, through house-to-house routes, or through salespersons. Some activities of a service nature (enameling, engraving, etc.) are included in manufacturing when they are performed primarily for the trade. They are considered nonmanufacturing when they are performed primarily to the order of the household consumer.

Relationship Between Annual Survey of Manufactures and Census of Manufactures

The Bureau of the Census conducts the annual survey of manufactures (ASM) in each of the 4 years between the censuses of manufactures. The ASM is based on a scientifically selected sample of approximately 55,000 establishments and collects the same industry statistics (employment, payroll, value of shipments, etc.) as the census of manufactures. In addition to collecting the information normally requested on the census form, the establishments in the ASM sample are requested to supply detailed information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services.

Establishment Basis of Reporting

The census of manufactures and the annual survey of manufactures are conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

In 1982, as in earlier years, a minimum size limit was set for including establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures except for data on number of establishments for a few industries.

This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company (see Auxiliaries).

Manufacturing Universe and Census Report Forms

The 1982 Census of Manufactures universe includes approximately 345,000 establishments. The amounts of information requested from manufacturing establishments were dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the annual survey of manufactures. The methods of obtaining information for the various subsets of the universe to arrive at the aggregate figures shown in this publication are described below.

1. Small Single-Unit Companies Not Sent a Report Form

In the 1982 Census of Manufactures, approximately 140,000 small single-establishment companies were excused from filing reports. Selection of these small

establishments was done on an industry-by-industry basis and was based on annual payroll and total shipments data as well as on the industry classification codes contained in the administrative records of other Federal agencies. The cutoffs were selected so that these administrative records cases would account for no more than 3 percent of the value of shipments for the industry. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed report forms.

Information on the physical location of the establishment, as well as information on payrolls, receipts (shipments), and industry classification, was obtained from the administrative records of other Federal agencies under special arrangements, which safeguarded their confidentiality. Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials were not distributed among specific products and materials for these establishments but were included in the product and material "not specified by kind" (n.s.k.) categories.

The industry classification codes included in the administrative records files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded to the four-digit SIC level. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes these administrative record cases were given only a two- or three-digit SIC group. For the 1982 Census of Manufactures, these establishments were sent a separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the four-digit SIC level. Establishments that did not return the classification form were coded later to those four-digit SIC industries identified as "not elsewhere classified" (n.e.c.) within the given two- or three-digit industry groups.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

2. Establishments Sent a Report Form

The 205,000 establishments covered in the mail canvass were divided into three groups:

a. **ASM sample establishments**—This group consisted of approximately 55,000 establishments covering all the units of large manufacturing establishments as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size (see appendix, Annual Survey of Manufactures).

In a census of manufactures year, the ASM report form (MA-1000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll,

and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services. Results of the ASM inquiries are included in tables 3c and 3d of this report.

The census part of the report form is one of approximately 200 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of this many forms to canvass the approximately 450 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries, as well as secondary products and miscellaneous services that establishments classified in these industries were likely to be performing. Respondents were requested to identify the products, the value of each product, and, in a large number of cases, the quantity of the product shipped during the survey year. Space was also provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided for the respondent to describe significant materials not identified on the form.

Finally, a wide variety of special inquiries was included to measure activities peculiar to a given industry, such as operations performed and equipment used.

b. **Large and medium establishments (non-ASM)**—

Approximately 100,000 establishments were included in this group. A variable cutoff, based on administrative records payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive one of the approximately 200 census of manufactures regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.

c. **Small single-unit establishments (non-ASM)**—This group consisted of approximately 50,000 establishments. For those industries where application of the variable cutoff for administrative records cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated or "short" form was used. These establishments received one of the approximately 80 versions of the short form, which requested summary product and material data and totals but no details on employment, payrolls, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics; the same

data were collected on the short as well as the long form. However, detailed information on materials consumed was not collected on the short form; thus its use would increase the values of the n.s.k. categories.

Auxiliaries

In this industry report, the data on employment and payroll are limited to operating manufacturing establishments. The census report form filed for auxiliaries (ES-9200) requested a description of the activity of the establishments serviced. However, the auxiliaries were coded only to the two-digit major group of the establishments they served; whereas, the operating establishments were coded to a four-digit manufacturing industry. Data for the approximately 10,000 separately operated auxiliaries are included in the paperbound geographic area series, the bound volumes of the census of manufactures, and in a report issued as part of the 1982 Enterprise Statistics survey.

Auxiliaries are establishments whose employees are primarily engaged in performing supporting services for other establishments of the same company, rather than for the general public or for other business firms. They can be at different locations from the establishments served or at the same location as one of those establishments but not operating as an integral part thereof and serving two or more establishments. Where auxiliary operations are conducted at the same location as the manufacturing operation and operate as an integral part thereof, they usually are included in the report for the operating manufacturing establishment.

Included in the broad category of auxiliaries are administrative offices. Employees in administrative offices are concerned with the general management of multiestablishment companies, i.e., with the general supervision and control of two units or more, such as manufacturing plants, mines, sales branches, or stores. The functions of these employees may include (1) program planning, including sales research and coordination of purchasing, production, and distribution; (2) company purchasing, including general contracts and purchasing methods; (3) company financial policy and accounting, tax accounting, company sales and profit reports, and personnel accounting; (4) general engineering, including design of product machinery and equipment, and direction of engineering effort conducted at the individual operation locations; (5) direction of company personnel matters; and (6) legal and patent matters.

Other types of auxiliaries serving the plants or central management of the company include purchasing offices, sales promotion offices, research and development organizations, etc.

Industry Classification of Establishments

Each of the establishments covered in the census was classified in one of approximately 450 manufacturing industries in accordance with the industry definitions in the SIC system. Under this system of classification, an industry is generally defined as a group of establishments producing a single product or a closely related group of products. The product groupings from which industry classifications are derived are based on considerations such as similarity of manufacturing processes, types of materials used, types of customers, and the like. The resulting group of plants must be significant in terms of its number, value added by manufacture, value of shipments, and number of employees. The system operates in such a way that the definitions progressively became narrower with successive additions of numerical digits. There are 20 major groups (two-digit SIC), 143 industry groups (three-digit SIC), and approximately 450

industries (four-digit SIC). The product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are about 1,500 classes of products, identified by a five-digit code, and about 11,000 products, identified by a seven-digit code. The seven-digit products are considered the primary products of the industry with the same four digits.

Accordingly, an establishment is usually classified in a particular industry on the basis of its major activity during a particular year, i.e., production of the products primary to that industry exceeds, in value, production of the products primary to any other single industry. In a few instances, however, the industry classification of an establishment is not only determined by the products it makes but also by the process employed in making those products. For example, establishments engaged in blast furnace operations, refining of nonferrous metals from ore, or rolling and drawing of nonferrous metals (processes which involve heavy capitalization in specialized equipment) would be classified according to the process used during a census year. These establishments then would be "frozen" in that industry during the following ASM years.

In either a census or ASM year, establishments included in the ASM sample with certainty weight, other than those involved with heavily capitalized activities described above, are reclassified by industry only if the change in the primary activity from the prior year is significant or the change has occurred for two successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year (see appendix, Annual Survey of Manufactures). However, in the following census year, these ASM plants are allowed to shift from one industry to another.

The result of these rules covering the switching of plants from one industry classification to another is that, at the aggregate level, some industries comprise different mixes of establishments between survey years, and establishment data for such industry statistics as employment and payroll may be tabulated in different industries between survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the four-digit SIC level, should be viewed with caution. This is true particularly for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-record cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

While some establishments produce only the primary products of the industry in which they are classified, all establishments of an industry rarely specialize to this extent. The industry statistics (employment, inventories, value added by manufacture, total value of shipments including resales and miscellaneous receipts, etc.) shown in tables 1a through 5a, therefore, reflect not only the primary activities of the establishments in that industry but also their secondary activities. The product statistics in tables 6a through 6c represent the output of all establishments whether or not they are classified in the same industry as the product. For this reason, in relating the industry statistics, especially the value of shipments to the product statistics, the

composition of the industry's output shown in table 5b should be considered.

The extent to which industry and product statistics may be matched with each other is measured by two ratios, which are computed from the figures shown in table 5b. The first of these ratios, called the primary product specialization ratio, measures the proportion of product shipments (both primary and secondary) of the establishments classified in the industry represented by the primary products of those establishments. The second ratio, called the coverage ratio, is the proportion of primary products shipped by the establishments classified in the industry to total shipments of such products by all manufacturing establishments.

However, establishments making products falling into the same industry category may use a variety of processes and materials to produce them. Also, the same industry classification (based on end products) may include both establishments that are highly integrated and those that put only the finishing touches on an already highly fabricated item. For example, the refrigeration industry includes instances of almost complete integration (production of the compressor, condensing unit, electric motor, casting, stamping of the case, and final assembly) all carried on at one plant. On the other hand, the condensing unit, the motor, and the case may be purchased and only assembled into the finished product.

In some instances, separate industry categories have been established for integrated and nonintegrated establishments. For other industries, the census provides separate statistics on the production of intermediate commodities made and used in the producing plant. For some industries characterized by many plants of the same company, separate figures on interplant transfer of products usually are shown.

Differences in the integration of production processes, types of operations, and alternatives in types of materials used should be considered when relating the industry statistics (employment, payrolls, value added, etc.) to the product and material data.

Value of Shipments for the Industry Compared With Value of Product Shipments

This industry report shows value of shipments data for industries and products. In tables 1a through 5a, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Product shipments shown in table 6a represent the total value of shipments of products classified as primary to an industry that were shipped by all manufacturing establishments regardless of their industry classification.

CENSUS DISCLOSURE RULES

In accordance with Federal law governing census reports, no data are published that would disclose the data for an individual establishment or company. However, the number of establishments classified in a specific industry is not considered a disclosure, so this item may be given even though other information is withheld.

The disclosure analysis for the industry statistics in tables 1a through 5a of this report is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line has been suppressed. However, the suppressed data are included in higher level totals. Additional disclosure analysis is performed for new capital expenditures that can be suppressed even though value of shipments data are publishable.

MICROFICHE AND COMPUTER TAPES

All the data in this report are available on microfiche. Selected data are also available on computer tape.

In addition to selected published data being on computer tape, one major data series, the location of manufacturing plants, will be available only on computer tape. This series presents the number of establishments by employment size class by four-digit SIC industry codes for States, counties, and places of 2,500 inhabitants or more. These data are available for both State and county by industry, and State and place by industry.

Microfiche reports are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Computer tapes are sold by the Data User Services Division, Customer Services (Tapes), Bureau of the Census, Washington, D.C. 20233.

SPECIAL TABULATIONS

Special tabulations of data collected in the 1982 Census of Manufactures may be obtained on computer tape or in tabular form. The data will be in summary form and subject to the same rules prohibiting disclosure of confidential information (including name, address, kind of business, or other data for individual business establishments or companies) as are the regular publications.

Special tabulations are prepared on a cost basis. A request for a cost estimate, as well as exact specifications on the type and format of the data to be provided, should be directed to the Chief, Industry Division, Bureau of the Census, Washington, D.C. 20233.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in this publication:

- Represents zero.
- (D) Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
- (NA) Not available.
- (NC) Not comparable.
- (S) Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
- (X) Not applicable.
- (Z) Less than half the unit shown.
- n.e.c. Not elsewhere classified.
- n.s.k. Not specified by kind.
- pt. Part.
- r Revised.
- SIC Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

Users' Guide for Locating Statistics

[For explanation of terms, see appendixes]

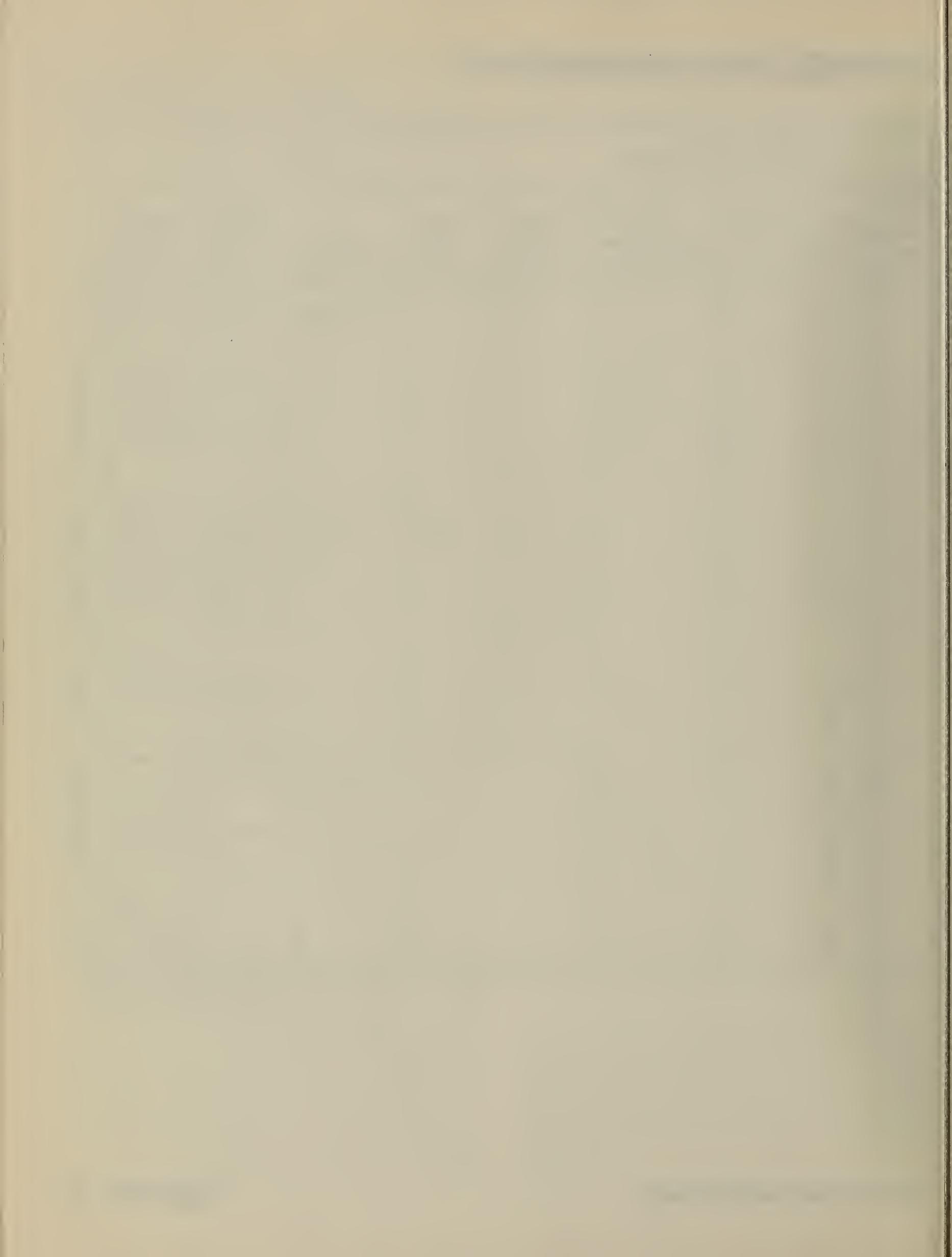
Item	Four-digit industry statistics		
	Historical	Operating ratios	By geographic area
1 Number of companies	1a		
2 Number of manufacturing establishments	1a		2
Employment and payroll:			
3 Number of employees	1a	1b	2
4 Payroll	1a	1b	2
5 Supplemental labor costs			
6 Production workers	1a	1b	2
7 Production-worker hours	1a	1b	2
8 Production-worker wages	1a	1b	2
Shipments, cost of materials, and value added:			
9 Value of shipments (four-digit)	1a	1b	2
10 Product class shipments (five-digit)			
11 Product shipments (seven-digit)			
12 Value added by manufacture	1a	1b	2
13 Cost of materials	1a	1b	2
14 Fuels and electric energy			
15 Materials consumed by kind			
Inventories:			
16 Total, end of year	1a		
17 By method of valuation			
18 By stage of fabrication			
Capital expenditures, assets, rental payments, and purchased services:			
19 New capital expenditures	1a		2
20 Used plant and equipment expenditures			
21 Gross assets			
22 Depreciation			
23 Retirements of buildings and machinery			
24 Rental payments			
25 Purchased services			
Ratios:			
26 Specialization	1a		
27 Coverage	1a		

*Number of companies with shipments of over \$100 thousand.

**Detailed information shown.

in This Report by Table Number

Four-digit industry statistics—Con.				Five-digit product class and seven-digit product statistics				
Summary and supplemental	By employment size	By industry and product class specialization	Materials consumed by kind	Industry-product analysis	Product shipments	Product class by geographic area	Historical product class	
3a **3a	4	5a			*6a			1 2
3a 3a **3d **3a **3a 3a	4	5a 5a 5a 5a 5a						3 4 5 6 7 8
3a	4	5a		5b, 5c 5b, 5c	6a 6a	6b	6c	9 10 11 12 13 14 15
3a **3a 3a, 3d	4	5a 5a	7					
3b, 3c 3b, 3c 3b	4	5a						16 17 18
**3a, **3d **3a, **3d **3d **3d **3d **3d **3d **3d	4	5a						19 20 21 22 23 24 25
3a 3a				5b 5b				26 27



Ferrous and Nonferrous Foundries

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DESCRIPTION OF INDUSTRIES AND SUMMARY OF FINDINGS

FERROUS AND NONFERROUS FOUNDRIES

This report shows 1982 Census of Manufactures statistics for establishments classified in each of the following industries:

SIC Code and Title

3321	Gray Iron Foundries
3322	Malleable Iron Foundries
3324	Steel Investment Foundries
3325	Steel Foundries, N.E.C.
3361	Aluminum Foundries
3362	Brass, Bronze, and Copper Foundries
3369	Nonferrous Foundries, N.E.C.

The industry statistics (employment, payroll, cost of materials, value of shipments, inventories, etc.) are reported for each establishment as a whole. Aggregates of such data for an industry reflect not only the primary activities of the establishments but also their activities in the manufacture of secondary products as well as their miscellaneous activities (contract work on materials owned by others, repair work, etc.). This fact should be taken into account in comparing industry statistics (tables 1a-5a) with product statistics (table 6a) showing shipments by all industries of the primary products of the specified industry. The extent of the "product mix" is indicated in table 5b, which shows the value of primary and secondary products shipped by establishments classified in the specified industry and the value of primary products of the industry shipped as secondary products by establishments classified in other industries.

Small single-unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. For these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated), data on payrolls and receipts were obtained from administrative records of other government agencies. The remaining statistics were developed from industry averages.

Establishment data were tabulated based on industry definitions contained in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 supplement.¹

INDUSTRY 3321, GRAY IRON FOUNDRIES

This industry comprises establishments primarily engaged in the manufacture of gray iron castings, including cast iron pressure and soil pipes and fittings.

In the 1982 Census of Manufactures, Industry 3321, Gray Iron Foundries, recorded employment of 97.3 thousand. The total value of shipments for establishments classified in this industry was \$6,202 million.

¹Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-005-00176-0.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 30 percent below the 138.8 thousand reported in 1977. The leading States in employment in 1982 were Ohio, Michigan, Illinois, and Wisconsin, accounting for approximately 42 percent of the industry's 1982 employment. These same States were the leaders in 1977, when they accounted for approximately 50 percent of the industry's employment.

Compared with 1981, employment decreased 24 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3321 shipped \$5,691 million of products primary to the industry, \$340 million of secondary products, and had \$171 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 94 percent (specialization ratio). In 1977, this specialization ratio was 96 percent.

Establishments in this industry also accounted for 91 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 88 percent. The products primary to industry 3321, no matter in what industry they were produced, appear in table 6a and aggregate to \$6,288 million in current prices.

The total cost of materials and services used by establishments classified in the gray iron foundries industry amounted to \$2,840 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 6 percent of total value of shipments.

INDUSTRY 3322, MALLEABLE IRON FOUNDRIES

This industry comprises establishments primarily engaged in the manufacture of malleable iron castings.

In the 1982 Census of Manufactures, Industry 3322, Malleable Iron Foundries, recorded employment of 6.5 thousand. The total value of shipments for establishments classified in this industry was \$323 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices

current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 64 percent below the 18.2 thousand reported in 1977. The leading States in employment in 1982 were Michigan, Texas, Pennsylvania, and Ohio, accounting for approximately 65 percent of the industry's 1982 employment. Data for Michigan, Texas, and Pennsylvania have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when Michigan, Ohio, Pennsylvania, and Wisconsin accounted for approximately 70 percent of the industry's employment.

Compared with 1981, employment decreased 30 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3322 shipped \$286 million of products primary to the industry, \$36 million of secondary products, and had \$1 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 89 percent (specialization ratio). In 1977, this specialization ratio was 86 percent.

Establishments in this industry also accounted for 77 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 93 percent. The products primary to industry 3322, no matter in what industry they were produced, appear in table 6a and aggregate to \$371 million in current prices.

The total cost of materials and services used by establishments classified in the malleable iron foundries industry amounted to \$113 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 10 percent of total value of shipments.

INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES

This industry comprises establishments primarily engaged in the manufacture of steel investment castings.

In the 1982 Census of Manufactures, Industry 3324, Steel Investment Foundries, recorded employment of 16.8 thousand. The total value of shipments for establishments classified in this industry was \$1,025 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 60 percent above the 10.5 thousand reported in 1977. The leading States in employment in 1982 were California, Michigan, Texas, and New

Hampshire, accounting for approximately 45 percent of the industry's 1982 employment. Data for Texas have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when Michigan, California, New Hampshire, and Oregon accounted for approximately 50 percent of the industry's employment.

Compared with 1981, employment increased 6 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3324 shipped \$922 million of products primary to the industry, \$92 million of secondary products, and had \$11 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 91 percent (specialization ratio). In 1977, this specialization ratio was 93 percent.

Establishments in this industry also accounted for 96 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 86 percent. The products primary to industry 3324, no matter in what industry they were produced, appear in table 6a and aggregate to \$964 million in current prices.

The total cost of materials and services used by establishments classified in the steel investment foundries industry amounted to \$363 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 7 percent of total value of shipments.

INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.

This industry comprises establishments primarily engaged in the manufacture of steel castings, not elsewhere classified, including carbon and alloy steel castings, except investment.

In the 1982 Census of Manufactures, Industry 3325, Steel Foundries, N.E.C., recorded employment of 36.9 thousand. The total value of shipments for establishments classified in this industry was \$2,091 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 32 percent below the 54.8 thousand reported in 1977. The leading States in employment in 1982 were Pennsylvania, Ohio, Wisconsin, and California, accounting for approximately 45 percent of the industry's 1982 employment. Data for California have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when Pennsylvania, Ohio, Illinois, and Wisconsin accounted for approximately 50 percent of the industry's employment.

Compared with 1981, employment decreased 32 percent. The 1981 data are based on the Bureau's annual survey of manufacturers (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3325 shipped \$1,840 million of products primary to the industry, \$195 million of secondary products, and had \$55 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 90 percent (specialization ratio). In 1977, this specialization ratio was 87 percent.

Establishments in this industry also accounted for 92 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio also was 91 percent. The products primary to industry 3325, no matter in what industry they were produced, appear in table 6a and aggregate to \$2,010 million in current prices.

The total cost of materials and services used by establishments classified in the steel foundries, n.e.c., industry amounted to \$826 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 20 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 12 percent of total value of shipments.

INDUSTRY 3361, ALUMINUM FOUNDRIES

This industry comprises establishments primarily engaged in the manufacture of aluminum and aluminum-base alloy castings.

In the 1982 Census of Manufactures, Industry 3361, Aluminum Foundries, recorded employment of 49.2 thousand. The total value of shipments for establishments classified in this industry was \$3,014 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 6 percent below the 52.2 thousand reported in 1977. The leading States in employment in 1982 were Ohio, California, Michigan, and Wisconsin, accounting for approximately 42 percent of the industry's 1982 employment. These same States were the leaders in 1977, when they accounted for approximately 45 percent of the industry's employment, although there has been some shift in the relative importance of individual States.

Compared with 1981, employment decreased 11 percent. The 1981 data are based on the Bureau's annual survey of manufacturers (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they

are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3361 shipped \$2,591 million of products primary to the industry, \$365 million of secondary products, and had \$58 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 88 percent (specialization ratio). In 1977, this specialization ratio also was 87 percent.

Establishments in this industry also accounted for 92 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio also was 92 percent. The products primary to industry 3361, no matter in what industry they were produced, appear in table 6a and aggregate to \$2,811 million in current prices.

The total cost of materials and services used by establishments classified in the aluminum foundries industry amounted to \$1,384 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 13 percent of total value of shipments.

INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES

This industry comprises establishments primarily engaged in the manufacture of copper and copper-base alloy castings.

In the 1982 Census of Manufactures, Industry 3362, Brass, Bronze, and Copper Foundries, recorded employment of 11.8 thousand. The total value of shipments for establishments classified in this industry was \$702 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 6 percent below the 12.6 thousand reported in 1977. The leading States in employment in 1982 were Pennsylvania, California, Illinois, and Wisconsin, accounting for approximately 45 percent of the industry's 1982 employment. This represents a shift from 1977 when Pennsylvania, California, Illinois, and Missouri accounted for approximately 50 percent of the industry's employment.

Compared with 1981, employment decreased 12 percent. The 1981 data are based on the Bureau's annual survey of manufacturers (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3362 shipped \$606 million of products primary to the industry, \$83 million of secondary products, and had \$13 million of miscellaneous receipts. Thus, the ratio of primary products to

the total of both secondary and primary products shipped by establishments in the industry was 88 percent (specialization ratio). In 1977, this specialization ratio was 85 percent.

Establishments in this industry also accounted for 85 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 74 percent. The products primary to industry 3362, no matter in what industry they were produced, appear in table 6a and aggregate to \$716 million in current prices.

The total cost of materials and services used by establishments classified in the brass, bronze, and copper foundries industry amounted to \$312 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 23 percent of total value of shipments.

INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.

This industry comprises establishments primarily engaged in the manufacture of other nonferrous metal castings, except aluminum, copper, and copper-base alloys.

In the 1982 Census of Manufactures, Industry 3369, Nonferrous Foundries, N.E.C., recorded employment of 14.9 thousand. The total value of shipments for establishments classified in this industry was \$916 million.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 19 percent below the 13.9 thousand reported in 1977. The leading States in employment in 1982 were Michigan, Illinois, Ohio, and New York, accounting for approximately 58 percent of the industry's 1982 employment. These same States were the leaders in 1977, when they accounted for approximately 50 percent of the industry's employment, although there has been some shift in the relative importance of individual States.

Compared with 1981, employment decreased 3 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 3369 shipped \$778 million of products primary to the industry, \$127 million of secondary products, and had \$11 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 86 percent (specialization ratio). In 1977, this specialization ratio also was 85 percent.

Establishments in this industry also accounted for 79 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio also was 77 percent. The products primary to industry 3369, no matter in what industry they were produced, appear in table 6a and aggregate to \$987 million in current prices.

The total cost of materials and services used by establishments classified in the nonferrous foundries, n.e.c., industry amounted to \$428 million in current prices. Data on specific materials consumed appear in table 7.

The establishments in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 21 percent of total value of shipments.

Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year ¹	Com- panies ² (no.)	All establishments ³		All employees		Production workers			Value added by manufac- ture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expendi- tures (million dollars)	Ratios		
		Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					Speci- aliza- tion (per- cent)	Cover- age (per- cent)	
INDUSTRY 3321, GRAY IRON FOUNDRIES															
1982 Census-----	800	925	635	97.3	1 965.0	78.2	139.8	1 463.0	3 310.5	2 840.4	6 202.2	348.0	750.0	94	91
1981 ASM-----	(NA)	(NA)	(NA)	128.5	2 581.6	105.5	202.2	1 973.1	4 166.1	4 330.6	8 471.7	741.2	857.1	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	131.0	2 410.1	106.6	203.6	1 835.6	4 211.6	3 612.2	7 825.3	653.5	778.4	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	152.1	2 677.9	126.9	249.9	2 107.7	4 708.3	4 338.3	8 979.1	626.7	796.9	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	149.2	2 531.6	125.8	252.4	2 023.7	4 597.3	4 045.3	8 658.4	610.8	686.8	(NA)	(NA)
1977 Census-----	865	984	683	138.8	2 146.0	116.8	236.1	1 703.2	4 070.7	3 355.5	7 388.7	503.1	654.4	96	88
1976 ASM-----	(NA)	(NA)	(NA)	136.0	1 945.4	114.5	229.7	1 534.4	3 522.7	3 122.8	6 597.4	394.7	611.6	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	138.0	1 723.1	116.5	227.4	1 356.9	3 101.6	2 767.8	5 829.4	366.9	576.0	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	151.8	1 795.6	130.0	264.5	1 443.9	3 035.4	2 783.6	5 786.7	439.7	594.8	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	152.4	1 695.9	130.7	272.3	1 379.2	2 750.0	2 029.4	4 790.8	226.4	399.4	(NA)	(NA)
1972 Census-----	892	993	723	138.4	1 387.4	118.1	245.7	1 119.7	2 257.0	1 639.4	3 876.5	202.5	351.8	94	87
1971 ASM-----	(NA)	(NA)	(NA)	132.6	1 210.1	112.9	224.7	960.8	1 945.9	1 386.7	3 332.5	234.5	334.5	(NA)	(NA)
1970 ASM-----	(NA)	(NA)	(NA)	141.0	1 153.5	120.8	239.7	914.5	1 785.3	1 311.3	3 085.4	217.3	328.0	(NA)	(NA)
1969 ASM-----	(NA)	(NA)	(NA)	144.0	1 182.4	124.6	260.1	959.6	1 959.4	1 312.5	3 247.8	145.7	289.6	(NA)	(NA)
1968 ASM-----	(NA)	(NA)	(NA)	136.0	1 052.4	117.5	245.1	853.2	1 727.2	1 156.1	2 883.5	174.6	244.9	(NA)	(NA)
1967 Census-----	969	1 061	774	138.0	965.3	119.3	242.3	780.2	1 543.1	1 075.3	2 637.8	196.3	240.8	93	86
INDUSTRY 3322, MALLEABLE IRON FOUNDRIES															
1982 Census-----	46	50	31	6.5	135.7	4.8	8.2	89.3	206.3	112.9	323.2	11.9	25.3	89	77
1981 ASM-----	(NA)	(NA)	(NA)	9.3	190.2	7.2	13.9	134.9	307.8	177.7	479.0	28.1	35.6	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	11.7	209.9	8.7	16.4	144.1	306.6	211.9	521.2	20.5	43.9	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	15.3	271.2	11.7	22.5	195.0	436.4	293.5	727.6	36.3	49.6	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	17.1	287.2	13.7	26.7	210.0	481.9	284.1	764.8	43.2	46.1	(NA)	(NA)
1977 Census-----	58	66	53	18.2	273.0	14.6	27.9	202.5	458.8	265.7	721.9	28.9	43.6	86	93
1976 ASM-----	(NA)	(NA)	(NA)	17.6	251.4	14.0	26.6	181.9	435.5	258.7	691.0	28.2	41.8	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	17.8	222.4	14.3	26.9	160.1	358.3	232.9	591.8	40.5	43.3	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	21.2	242.0	17.7	34.3	190.4	380.9	276.1	654.7	29.2	46.6	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	23.2	258.0	19.5	39.6	204.2	365.0	211.8	572.3	24.9	39.3	(NA)	(NA)
1972 Census-----	64	73	64	22.5	234.5	18.7	38.1	184.3	342.6	167.1	507.9	34.9	33.2	87	91
1971 ASM-----	(NA)	(NA)	(NA)	22.6	205.4	18.8	37.5	159.7	285.3	151.7	437.7	33.7	33.5	(NA)	(NA)
1970 ASM-----	(NA)	(NA)	(NA)	23.0	187.4	18.9	37.5	144.5	270.1	137.1	403.0	17.9	32.4	(NA)	(NA)
1969 ASM-----	(NA)	(NA)	(NA)	23.6	188.0	19.6	39.6	147.1	289.6	134.0	422.3	28.4	28.6	(NA)	(NA)
1968 ASM-----	(NA)	(NA)	(NA)	25.0	196.1	21.0	42.5	154.0	314.0	144.4	459.2	27.3	29.5	(NA)	(NA)
1967 Census-----	72	81	75	25.4	187.0	21.4	43.0	147.3	296.5	142.9	438.3	21.9	29.5	85	89
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES															
1982 Census-----	117	132	108	16.8	299.4	12.6	24.4	197.2	635.7	363.3	1 024.6	32.9	162.6	91	96
1981 ASM-----	(NA)	(NA)	(NA)	15.8	257.8	11.9	24.1	171.8	588.0	340.3	912.7	20.3	164.1	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	16.2	251.2	12.6	26.2	168.6	553.5	352.3	898.5	33.9	154.1	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	15.1	213.8	11.9	24.7	150.9	466.5	287.4	728.6	25.4	137.7	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	12.0	152.0	9.5	19.4	109.2	325.3	177.6	487.3	10.1	89.2	(NA)	(NA)
1977 Census-----	80	92	68	10.5	128.7	8.1	16.5	85.9	267.4	144.8	407.5	10.9	65.6	93	86
1976 ASM-----	(NA)	(NA)	(NA)	9.9	117.3	7.7	15.4	79.6	251.3	146.6	395.2	13.2	58.6	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	10.4	112.8	8.3	16.5	79.6	240.0	135.1	376.5	22.3	53.7	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	13.9	137.8	11.4	23.0	96.6	279.3	144.9	408.0	11.7	69.4	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	11.6	102.5	9.2	18.4	71.1	194.2	100.3	284.5	7.0	42.2	(NA)	(NA)
1972 Census-----	68	74	62	11.2	93.2	8.6	17.2	63.3	175.6	89.4	262.2	11.1	38.1	86	94
INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.															
1982 Census-----	291	331	229	36.9	713.0	28.4	49.6	498.8	1 209.0	826.3	2 091.4	99.6	313.2	90	92
1981 ASM-----	(NA)	(NA)	(NA)	53.9	1 000.8	43.5	82.4	753.5	1 839.2	1 240.9	3 084.0	133.6	360.6	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	60.8	1 071.5	49.6	93.8	822.2	2 040.1	1 376.8	3 392.1	168.5	433.6	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	61.7	1 027.7	51.3	101.8	807.7	1 998.4	1 226.4	3 222.0	146.4	394.4	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	57.3	878.7	46.7	91.4	666.9	1 608.6	997.1	2 592.2	112.7	357.5	(NA)	(NA)
1977 Census-----	287	323	229	54.8	781.5	44.2	87.3	591.0	1 439.8	882.3	2 312.1	115.9	341.3	87	91
1976 ASM-----	(NA)	(NA)	(NA)	52.8	681.4	42.8	83.4	513.9	1 287.0	832.7	2 103.4	207.1	322.5	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	54.7	654.9	45.0	89.9	506.6	1 276.0	823.7	2 073.7	90.0	277.0	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	52.5	574.7	43.7	86.2	449.2	1 028.6	708.1	1 685.8	63.5	250.4	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	49.1	494.7	40.6	81.7	387.1	757.0	442.2	1 210.1	38.7	144.4	(NA)	(NA)
1972 Census-----	225	260	201	46.7	440.2	38.5	75.5	337.4	706.0	368.4	1 067.4	31.5	152.		

Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years—Con.

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year ¹	Com- panies ² (no.)	All establishments ³		All employees		Production workers			Value added by manufac- ture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	Ratios		
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					Spec- cial- ization (per- cent)	Cover- age (per- cent)	
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES															
1982 Census-----	487	499	162	11.8	201.8	9.2	16.6	138.5	381.9	311.6	702.2	19.3	92.7	88	85
1981 ASM-----	(NA)	(NA)	(NA)	13.4	208.9	10.7	20.3	145.1	414.7	406.2	825.7	24.7	99.0	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	14.0	207.2	11.2	22.0	145.7	440.7	384.3	825.3	31.0	110.4	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	14.1	201.4	11.6	22.7	148.9	405.8	387.0	783.0	58.2	88.9	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	12.8	161.3	10.5	20.3	116.5	299.2	287.9	589.0	15.1	64.5	(NA)	(NA)
1977 Census-----	476	489	180	12.6	148.3	10.2	19.8	106.7	283.0	274.1	553.3	17.9	59.2	85	74
1976 ASM-----	(NA)	(NA)	(NA)	13.2	143.8	10.4	20.2	103.5	286.2	258.1	545.6	18.1	62.8	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	12.5	135.5	9.9	18.2	96.5	262.8	248.4	512.1	16.3	68.4	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	15.7	144.9	12.1	24.1	105.3	281.5	329.5	610.2	14.8	68.7	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	15.2	138.6	12.9	25.4	103.9	266.3	250.7	509.2	13.6	62.5	(NA)	(NA)
1972 Census-----	490	507	195	15.4	129.6	13.0	25.7	96.3	236.9	229.5	465.3	17.4	50.7	84	81
1971 ASM-----	(NA)	(NA)	(NA)	16.4	133.4	13.2	27.3	97.9	221.2	211.6	434.5	8.8	58.1	(NA)	(NA)
1970 ASM-----	(NA)	(NA)	(NA)	18.2	134.7	15.1	31.1	100.9	247.4	232.2	476.9	25.7	58.2	(NA)	(NA)
1969 ASM-----	(NA)	(NA)	(NA)	17.7	120.6	14.8	28.4	89.5	221.9	212.8	433.0	14.3	51.8	(NA)	(NA)
1968 ASM-----	(NA)	(NA)	(NA)	16.1	114.3	13.5	27.3	83.6	211.8	198.8	409.2	10.4	49.9	(NA)	(NA)
1967 Census-----	516	534	207	17.9	119.8	15.1	30.6	89.2	226.8	218.0	445.2	12.4	52.5	83	82
INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.															
1982 Census-----	351	358	148	14.9	264.9	11.8	22.3	180.8	478.5	427.8	916.1	27.5	119.2	86	79
1981 ASM-----	(NA)	(NA)	(NA)	15.3	283.5	12.2	24.9	196.7	550.9	477.6	1 016.4	42.4	119.1	(NA)	(NA)
1980 ASM-----	(NA)	(NA)	(NA)	16.8	268.8	13.3	27.0	189.1	512.1	477.5	982.1	33.8	116.6	(NA)	(NA)
1979 ASM-----	(NA)	(NA)	(NA)	19.0	263.1	15.8	31.8	187.3	543.3	499.0	1 040.8	51.0	111.6	(NA)	(NA)
1978 ASM-----	(NA)	(NA)	(NA)	17.9	226.6	14.7	29.2	166.5	472.1	421.3	881.5	22.7	101.1	(NA)	(NA)
1977 Census-----	359	365	164	17.3	204.1	14.2	28.0	144.9	413.9	396.1	813.7	24.7	84.7	85	77
1976 ASM-----	(NA)	(NA)	(NA)	20.2	190.5	16.4	31.1	136.4	374.2	368.2	741.5	23.5	83.9	(NA)	(NA)
1975 ASM-----	(NA)	(NA)	(NA)	16.6	164.7	13.1	25.1	117.9	311.2	304.0	626.6	14.8	77.7	(NA)	(NA)
1974 ASM-----	(NA)	(NA)	(NA)	19.7	185.9	16.4	31.3	137.7	369.2	349.5	703.4	12.8	98.1	(NA)	(NA)
1973 ASM-----	(NA)	(NA)	(NA)	20.7	188.7	17.3	34.8	142.8	358.9	306.9	658.9	10.9	77.8	(NA)	(NA)
1972 Census-----	321	329	167	20.3	174.0	16.9	34.4	130.4	314.0	276.4	588.6	17.3	63.8	83	79
1971 ASM-----	(NA)	(NA)	(NA)	17.5	145.1	14.2	29.3	105.3	235.0	202.4	442.7	8.3	47.7	(NA)	(NA)
1970 ASM-----	(NA)	(NA)	(NA)	21.3	166.9	17.5	36.2	121.4	275.9	221.1	488.7	12.5	59.1	(NA)	(NA)
1969 ASM-----	(NA)	(NA)	(NA)	25.3	189.1	20.5	40.5	141.1	356.4	261.4	620.6	30.6	52.7	(NA)	(NA)
1968 ASM-----	(NA)	(NA)	(NA)	25.1	177.6	20.5	41.2	132.0	349.6	248.9	596.3	16.1	55.9	(NA)	(NA)
1967 Census-----	352	360	180	26.6	176.7	22.1	45.0	131.2	324.1	233.0	556.3	18.2	51.7	83	82

¹In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1967, see 1967 Census of Manufactures, vol. II, table 1 of the Industry chapter.

²For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

³Includes establishments with payroll at any time during year.

⁴Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Up to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown above and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown below:

Industries	End-of-1981 inventories (million dollars)	End-of-1982 inventories (million dollars)	1982 value added by manufacture (million dollars)
Industry 3321, Gray iron foundries-----	749.3	672.3	3 405.1
Industry 3322, Malleable iron foundries-----	27.7	22.7	213.8
Industry 3324, Steel investment foundries-----	183.3	154.2	685.0
Industry 3325, Steel foundries, n.e.c.-----	336.7	275.8	1 312.0
Industry 3361, Aluminum foundries-----	310.0	272.5	1 638.5
Industry 3362, Brass, bronze, and copper foundries-----	93.7	81.5	397.3
Industry 3369, Nonferrous foundries, n.e.c.-----	124.1	109.0	496.1

See Inventories in appendixes for explanation of the difference between end-of-1981 inventory figure shown in table and corresponding figure shown in footnote.

Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
INDUSTRY 3321, GRAY IRON FOUNDRIES									
1982 Census-----	20 195	80	1 788	10.46	46	77	34 024	59	23.68
1981 ASM-----	20 090	82	1 917	9.76	51	82	32 421	62	20.60
1980 ASM-----	18 398	81	1 910	9.02	46	77	32 150	57	20.69
1979 ASM-----	17 606	83	1 969	8.43	48	78	30 955	57	18.84
1978 ASM-----	16 968	84	2 006	8.02	47	76	30 813	55	18.21
1977 Census-----	15 461	84	2 021	7.21	45	74	29 328	53	17.24
1976 ASM-----	14 304	84	2 006	6.68	47	77	25 902	55	15.34
1975 ASM-----	12 486	84	1 952	5.97	47	77	22 475	56	13.64
1974 ASM-----	11 829	86	2 035	5.46	48	79	19 996	59	11.48
1973 ASM-----	11 128	86	2 083	5.07	42	78	18 045	62	10.10
1972 Census-----	10 025	85	2 080	4.56	42	78	16 308	61	9.19
1971 ASM-----	9 126	85	1 990	4.28	42	78	14 675	62	8.66
1970 ASM-----	8 181	86	1 984	3.82	43	80	12 662	65	7.45
1969 ASM-----	8 211	87	2 087	3.69	40	77	13 607	60	7.53
1968 ASM-----	7 738	86	2 086	3.48	40	77	12 700	61	7.05
1967 Census-----	6 995	86	2 031	3.22	41	77	11 182	63	6.37
INDUSTRY 3322, MALLEABLE IRON FOUNDRIES									
1982 Census-----	20 877	74	1 708	10.89	35	77	31 738	66	25.16
1981 ASM-----	20 452	77	1 931	9.71	37	77	33 097	62	22.14
1980 ASM-----	17 940	74	1 885	8.79	41	81	26 205	68	18.70
1979 ASM-----	17 725	76	1 923	8.67	40	78	28 523	62	19.40
1978 ASM-----	16 795	80	1 949	7.87	37	75	28 181	60	18.05
1977 Census-----	15 000	80	1 911	7.26	37	75	25 209	60	16.44
1976 ASM-----	14 284	80	1 900	6.84	37	74	24 744	58	16.37
1975 ASM-----	12 494	80	1 881	5.95	39	77	20 129	62	13.32
1974 ASM-----	11 415	83	1 938	5.55	42	79	17 967	64	11.10
1973 ASM-----	11 121	84	2 031	5.16	37	82	15 733	71	9.22
1972 Census-----	10 422	83	2 037	4.84	33	79	15 227	68	8.99
1971 ASM-----	9 088	83	1 995	4.26	35	82	12 624	72	7.61
1970 ASM-----	8 148	82	1 984	3.85	34	81	11 743	69	7.20
1969 ASM-----	7 966	83	2 020	3.71	32	76	12 271	65	7.31
1968 ASM-----	7 844	84	2 024	3.62	31	74	12 560	62	7.39
1967 Census-----	7 362	84	2 009	3.43	33	75	11 673	63	6.90
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES									
1982 Census-----	17 821	75	1 937	8.08	35	65	37 839	47	26.05
1981 ASM-----	16 316	75	2 025	7.13	37	66	37 215	44	24.40
1980 ASM-----	15 506	78	2 079	6.44	39	67	34 167	45	21.13
1979 ASM-----	14 159	79	2 076	6.11	39	69	30 894	46	18.89
1978 ASM-----	12 667	79	2 042	5.63	36	68	27 108	47	16.77
1977 Census-----	12 257	77	2 037	5.21	36	67	25 467	48	16.21
1976 ASM-----	11 848	78	2 000	5.17	37	67	25 384	47	16.32
1975 ASM-----	10 846	80	1 988	4.82	36	66	23 077	47	14.55
1974 ASM-----	9 914	82	2 018	4.20	36	69	20 094	49	12.14
1973 ASM-----	8 836	79	2 000	3.86	35	71	16 741	53	10.55
1972 Census-----	8 321	77	2 000	3.68	34	70	15 679	53	10.21
INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.									
1982 Census-----	19 322	77	1 746	10.06	40	74	32 764	59	24.38
1981 ASM-----	18 568	81	1 894	9.14	40	73	34 122	54	22.32
1980 ASM-----	17 623	82	1 891	8.77	41	72	33 554	53	21.75
1979 ASM-----	16 656	83	1 984	7.93	38	70	32 389	51	19.63
1978 ASM-----	15 335	82	1 957	7.30	38	72	28 073	55	17.60
1977 Census-----	14 261	81	1 975	6.77	38	72	26 274	54	16.49
1976 ASM-----	12 905	81	1 949	6.16	40	72	24 375	53	15.43
1975 ASM-----	11 973	82	1 998	5.64	40	71	23 327	51	14.19
1974 ASM-----	10 947	83	1 973	5.21	42	76	19 592	56	11.93
1973 ASM-----	10 075	83	2 012	4.74	37	77	15 418	65	9.27
1972 Census-----	9 426	82	1 961	4.47	35	76	15 118	62	9.35
INDUSTRY 3361, ALUMINUM FOUNDRIES									
1982 Census-----	18 825	82	1 896	9.04	46	77	32 776	57	21.16
1981 ASM-----	17 836	84	1 904	8.40	48	77	31 989	56	19.97
1980 ASM-----	16 246	84	1 901	7.64	50	78	29 245	56	18.31
1979 ASM-----	15 218	85	1 959	7.03	51	79	27 522	55	16.47
1978 ASM-----	14 434	84	1 957	6.79	50	78	25 686	56	15.67
1977 Census-----	13 245	85	1 952	6.15	49	77	24 190	55	14.63
1976 ASM-----	12 016	83	1 948	5.68	49	78	21 010	57	12.99
1975 ASM-----	11 073	82	1 872	5.35	48	79	18 481	60	12.04
1974 ASM-----	9 974	84	1 885	4.86	50	80	17 341	58	10.90
1973 ASM-----	9 542	85	2 007	4.39	45	78	16 569	58	9.66
1972 Census-----	9 144	84	1 990	4.19	44	77	15 718	58	9.35
1971 ASM-----	8 482	83	2 038	3.79	44	77	14 469	59	8.59
1970 ASM-----	7 616	84	1 985	3.49	44	78	12 554	61	7.51
1969 ASM-----	7 708	86	2 029	3.48	45	78	13 105	59	7.53
1968 ASM-----	7 373	85	2 018	3.32	44	77	12 472	59	7.24
1967 Census-----	6 923	86	2 031	3.09	44	78	11 429	61	6.56

See footnotes at end of table.

Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES									
1982 Census-----	17 102	78	1 804	8.34	44	73	32 364	53	23.01
1981 ASM-----	15 590	80	1 897	7.15	49	74	30 948	50	20.43
1980 ASM-----	14 800	80	1 964	6.62	47	72	31 479	47	20.03
1979 ASM-----	14 284	82	1 957	6.56	49	75	28 780	50	17.88
1978 ASM-----	12 602	82	1 933	5.74	49	76	23 375	54	14.74
1977 Census-----	11 770	81	1 941	5.39	50	76	22 460	52	14.29
1976 ASM-----	10 894	79	1 942	5.12	47	74	21 682	50	14.17
1975 ASM-----	10 840	79	1 838	5.30	49	75	21 024	52	14.44
1974 ASM-----	9 229	77	1 992	4.37	54	78	17 930	51	11.68
1973 ASM-----	9 118	85	1 969	4.09	49	76	17 520	52	10.48
1972 Census-----	8 416	84	1 977	3.75	49	77	15 383	55	9.22
1971 ASM-----	8 134	80	2 068	3.59	49	79	13 488	60	8.10
1970 ASM-----	7 401	83	2 060	3.24	49	77	13 593	54	7.95
1969 ASM-----	6 814	84	1 919	3.15	49	77	12 537	54	7.81
1968 ASM-----	7 099	84	2 022	3.06	49	77	13 155	54	7.76
1967 Census-----	6 693	84	2 026	2.92	49	76	12 670	53	7.41
INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.									
1982 Census-----	17 779	79	1 890	8.11	47	76	32 114	55	21.46
1981 ASM-----	18 529	80	2 041	7.90	47	75	36 007	51	22.12
1980 ASM-----	16 000	79	2 030	7.00	49	76	30 482	52	18.97
1979 ASM-----	13 847	83	2 013	5.89	48	73	28 595	48	17.08
1978 ASM-----	12 659	82	1 986	5.70	48	73	26 374	48	16.17
1977 Census-----	11 798	82	1 972	5.17	49	74	23 925	49	14.78
1976 ASM-----	9 431	81	1 896	4.39	50	75	18 525	51	12.03
1975 ASM-----	9 922	79	1 916	4.70	49	75	18 747	53	12.40
1974 ASM-----	9 437	83	1 909	4.40	50	76	18 741	50	11.80
1973 ASM-----	9 116	84	2 012	4.10	47	75	17 338	53	10.31
1972 Census-----	8 571	83	2 036	3.79	47	77	15 468	55	9.13
1971 ASM-----	8 291	81	2 063	3.59	46	78	13 429	62	8.02
1970 ASM-----	7 836	82	2 069	3.35	45	79	12 953	60	7.62
1969 ASM-----	7 474	81	1 976	3.48	42	73	14 087	53	8.80
1968 ASM-----	7 076	82	2 010	3.20	42	72	13 928	51	8.49
1967 Census-----	6 643	83	2 036	2.92	42	74	12 184	55	7.20

Note: For qualifications of data, see footnotes on table 1a.

Table 2. Industry Statistics for Selected States: 1982 and 1977

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1982										1977			
	All establishments ²		All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ³ (1,000)	Value added by manufacture (million dollars)	
	E1	Total (no.)	With 20 employees or more (no.)	Number ³ (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)							
INDUSTRY 3321, GRAY IRON FOUNDRIES														
United States-----	-	925	635	97.3	1 965.0	78.2	139.8	1 463.0	3 310.5	2 840.4	6 202.2	348.0	138.8	4 070.7
Alabama-----	-	42	36	7.2	123.9	5.9	10.8	90.1	232.4	291.8	517.1	30.6	9.3	237.9
Arkansas-----	-	7	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
California-----	E1	47	28	2.9	48.6	2.4	4.4	35.7	94.0	76.3	169.3	(D)	3.8	100.3
Colorado-----	-	6	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Connecticut-----	E3	12	9	.9	14.4	.7	1.3	10.7	22.7	13.1	35.9	.9	1.3	28.0
Florida-----	-	8	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Georgia-----	-	16	9	1.8	22.0	1.5	2.1	13.8	46.0	20.7	66.9	(D)	1.3	27.2
Illinois-----	-	56	43	8.3	202.3	6.4	10.8	141.8	317.2	256.9	582.7	47.6	11.8	414.3
Indiana-----	E1	47	39	6.3	126.8	5.0	8.8	95.9	198.7	141.1	342.1	11.8	9.3	258.6
Iowa-----	-	12	9	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.6	36.6
Kansas-----	E2	19	11	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Kentucky-----	-	3	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Louisiana-----	E2	6	4	.2	3.4	.2	.3	2.9	7.2	5.7	12.9	.7	.2	5.8
Maryland-----	E1	8	6	.3	4.4	.3	.4	3.1	10.3	5.9	16.6	.1	CC	(D)
Massachusetts-----	E1	32	21	1.3	19.9	1.1	1.9	15.2	27.3	22.3	50.9	1.2	1.6	35.4
Michigan-----	-	68	47	9.5	233.1	7.7	14.3	174.7	440.0	453.8	900.9	65.6	24.4	829.4
Minnesota-----	E2	23	18	1.1	21.7	.8	1.5	15.1	32.0	22.6	55.2	1.5	EE	(D)
Mississippi-----	E8	4	4	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Missouri-----	E1	26	14	1.7	27.9	1.4	2.4	20.9	55.4	23.0	83.1	(D)	2.0	43.9
New Jersey-----	-	19	12	1.7	30.8	1.3	2.6	21.6	63.1	76.9	140.3	2.7	2.4	73.9
New York-----	E3	30	18	1.8	29.2	1.4	2.7	22.2	33.9	31.4	68.1	11.8	2.5	58.6
North Carolina-----	E1	17	13	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.2	22.2
Ohio-----	-	97	73	15.5	396.2	12.8	23.8	317.2	651.7	488.7	1 156.6	64.1	21.3	802.7
Oklahoma-----	E2	21	12	1.2	18.4	.9	1.6	13.0	28.0	27.8	55.8	4.2	1.6	27.0
Oregon-----	-	10	5	.3	6.8	.3	.5	5.0	12.4	7.9	20.7	.5	.4	9.7

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1982 and 1977—Con.

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry and geographic area	1982												1977	
	All establishments ²		All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Costs of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ³ (1,000)	Value added by manufacture (million dollars)	
	E ¹	Total (no.)	With 20 employees or more (no.)	Number ³ (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)							
INDUSTRY 3321, GRAY IRON FOUNDRIES—Con.														
Pennsylvania	-	88	61	7.1	137.4	5.7	10.0	100.9	224.7	198.8	434.9	16.6	8.5	198.9
Rhode Island	E3	5	4	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	2.9
South Carolina	E4	5	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Tennessee	-	21	17	3.6	57.6	3.0	5.7	43.1	98.4	101.8	199.7	5.4	FF	(D)
Texas	-	47	27	5.1	85.7	4.2	7.4	63.5	141.9	96.9	234.9	12.3	5.4	123.6
Utah	-	7	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Virginia	-	18	13	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	FF	(D)
Washington	-	9	7	.4	9.3	.3	.7	6.8	14.9	8.6	24.5	.7	BB	(D)
West Virginia	-	10	6	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Wisconsin	-	60	45	7.9	152.5	6.0	10.5	108.3	262.7	205.4	474.8	25.1	9.5	277.8
INDUSTRY 3322, MALLEABLE IRON FOUNDRIES														
United States	E1	50	31	6.5	135.7	4.8	8.2	89.3	206.3	112.9	323.2	11.9	18.2	458.8
Connecticut	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Iowa	E3	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Michigan	-	5	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	6.2	217.3
New Hampshire	E5	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New York	-	5	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Ohio	-	5	4	.6	12.2	.5	1.0	9.4	21.3	9.5	31.4	.7	2.6	44.8
Pennsylvania	E3	5	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.4	50.2
Texas	-	2	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Wisconsin	-	3	3	.6	9.3	.5	.7	6.7	4.4	6.2	11.3	(D)	1.6	39.7
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES														
United States	-	132	108	16.8	299.4	12.6	24.4	197.2	635.7	363.3	1 024.6	32.9	10.5	267.4
Alabama	-	3	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Arizona	-	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California	-	21	18	3.0	49.1	2.4	4.6	30.5	107.2	61.4	168.8	8.8	EE	(D)
Connecticut	-	3	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Florida	-	5	4	.6	9.9	.4	.7	5.7	19.6	9.3	30.5	.3	AA	(D)
Illinois	-	3	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Indiana	-	2	2	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Michigan	-	12	9	1.7	34.6	1.2	2.2	22.4	86.2	42.8	135.9	(D)	1.7	50.3
New Hampshire	E1	7	6	1.3	20.1	.9	1.9	11.1	40.5	14.9	55.4	1.5	1.1	27.5
New Jersey	-	5	4	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.8	22.0
New York	-	7	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Ohio	E1	12	11	1.1	18.1	.8	1.7	12.1	33.2	23.6	57.1	3.8	.7	12.4
Oregon	-	4	4	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Pennsylvania	E3	10	8	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	5.6
Texas	-	11	9	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Virginia	-	1	1	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Wisconsin	-	7	7	.6	9.3	.5	.9	6.1	18.6	11.2	30.5	(D)	.3	10.1
INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.														
United States	E1	331	229	36.9	713.0	28.4	49.6	498.8	1 209.0	826.3	2 091.4	99.6	52.2	1 262.7
Alabama	-	10	10	1.4	23.5	1.1	2.1	17.3	50.0	41.6	90.9	(D)	EE	(D)
Arizona	-	3	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
California	-	33	23	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.4	63.4
Connecticut	-	4	4	.2	5.4	.2	.4	3.6	9.2	4.8	14.0	(D)	.5	16.3
Delaware	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Georgia	-	3	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Illinois	E1	22	11	2.0	31.3	1.6	2.4	22.4	42.1	29.5	75.7	7.2	4.9	131.2
Indiana	-	15	9	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Iowa	-	8	5	.9	17.0	.7	1.1	12.9	34.8	31.3	67.7	(D)	EE	(D)
Kansas	-	8	3	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Louisiana	-	7	5	1.1	18.4	.9	1.5	11.9	33.6	22.2	56.9	4.7	1.4	27.6
Massachusetts	E1	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Michigan	E4	22	12	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	2.3	59.2
Minnesota	-	4	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Mississippi	E1	4	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Missouri	E3	14	8	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
New Jersey	-	4	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
New York	E3	13	7	1.6	35.5	1.2	2.0	23.6	54.2	31.6	91.2	2.8	3.3	93.3
Ohio	-	28	19	4.6	94.1	3.6	6.1	66.9	161.1	109.7	272.6	11.2	6.9	186.5
Oklahoma	E7	6	5	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Oregon	-	8	5	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Pennsylvania	-	38	27	5.0	110.3	3.7	6.5	76.5	152.5	121.7	297.6	10.3	10.3	252.4
Tennessee	-	5	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Texas	E2	15	13	1.5	26.2	1.3	2.6	21.1	54.7	29.1	83.6	12.4	EE	(D)
Utah	-	2	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Virginia	E7	3	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Washington	E1	14	11	1.3	29.1	1.0	1.9	22.2	69.2	35.6	106.3	3.4	1.4	36.9
Wisconsin	-	22	21	3.7	75.2	2.8	4.7	51.1	110.6	82.9	200.5	12.8	4.8	145.5

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1982 and 1977—Con.

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1982												1977	
	All establishments ²			All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ³ (1,000)	Value added by manufacture (million dollars)
	E ¹	Total (no.)	With 20 employees or more (no.)	Number ³ (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
INDUSTRY 3361, ALUMINUM FOUNDRIES														
United States	E1	1 052	477	49.2	926.2	40.2	76.2	688.6	1 612.6	1 384.0	3 013.6	126.4	52.2	1 262.7
Alabama	-	20	5	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Arkansas	E3	11	8	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	9.9
California	-	164	81	6.1	106.4	5.1	9.8	78.5	199.7	126.4	331.5	14.7	5.9	137.3
Colorado	-	12	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	2.8
Connecticut	E1	19	7	.6	10.0	.5	1.0	6.6	16.7	12.3	29.1	1.0	.7	15.7
Florida	E7	19	3	.3	3.9	.2	.4	3.0	5.9	5.3	11.3	.3	.3	5.1
Georgia	-	6	3	.3	5.7	.3	.5	4.7	12.6	10.7	22.9	(D)	BB	(D)
Illinois	E1	93	39	3.5	59.8	2.8	5.3	43.1	102.3	89.5	192.2	9.2	3.8	86.8
Indiana	-	40	19	2.5	64.0	2.0	3.9	49.0	109.7	127.8	239.7	4.6	2.6	85.0
Iowa	E2	18	6	.6	10.7	.5	.8	7.3	15.3	13.4	29.4	(D)	.8	14.2
Kansas	E8	12	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Kentucky	-	5	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Maryland	E1	9	4	.2	3.1	.2	.4	2.4	6.2	2.8	8.9	.2	AA	(D)
Massachusetts	E2	33	8	.8	13.8	.7	1.3	10.1	23.6	14.5	38.2	.9	.7	15.7
Michigan	-	72	37	4.0	77.6	3.3	6.2	59.5	140.0	122.1	263.5	9.8	4.3	120.3
Minnesota	-	27	18	2.1	42.6	1.7	3.2	31.4	65.0	53.1	118.2	4.8	2.0	42.4
Mississippi	E1	4	4	.2	4.1	.2	.4	3.1	8.9	9.7	18.7	(D)	(NA)	(NA)
Missouri	E4	24	11	1.4	25.3	1.2	2.3	18.4	39.8	36.5	77.0	2.0	1.3	27.7
New Hampshire	-	10	7	.7	12.8	.6	1.2	9.7	20.1	10.4	29.7	2.5	BB	(D)
New Jersey	E2	27	11	.9	15.3	.8	1.4	11.0	25.2	17.4	41.9	(D)	.8	16.4
New York	-	49	23	2.6	59.0	2.1	4.0	45.3	82.9	94.0	177.0	(D)	3.0	78.9
North Carolina	-	12	7	.4	6.3	.3	.6	4.5	20.9	13.8	33.9	(D)	.5	10.3
Ohio	E1	117	61	6.9	131.5	5.5	10.4	96.8	240.7	205.8	449.3	12.6	8.7	228.6
Oklahoma	E1	11	3	.3	5.7	.2	.4	3.4	11.9	8.4	20.1	.5	AA	(D)
Pennsylvania	-	64	27	3.2	58.8	2.7	5.0	46.5	117.2	66.0	183.4	4.9	3.5	81.8
Rhode Island	E4	5	3	.2	1.8	.1	.3	1.2	2.6	1.6	4.1	.1	(NA)	(NA)
South Carolina	-	10	5	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	11.6
Tennessee	-	11	6	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Texas	E2	47	20	2.0	29.9	1.7	3.3	22.6	47.7	35.6	85.1	3.9	1.5	25.5
Washington	E2	9	3	.2	5.2	.2	.4	3.8	8.3	5.5	14.2	.4	.4	7.7
Wisconsin	-	47	29	3.6	71.9	2.9	5.7	52.1	117.3	119.7	239.5	11.3	4.9	111.4
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES														
United States	E2	499	162	11.8	201.8	9.2	16.6	138.5	381.9	311.6	702.2	19.3	12.6	283.0
Alabama	-	4	4	.2	2.5	.1	.3	1.6	6.3	3.4	9.4	(D)	BB	(D)
California	E3	62	25	1.4	23.5	1.2	2.2	17.1	46.9	32.8	80.7	2.3	1.6	30.9
Connecticut	E1	13	3	.2	3.0	.2	.3	2.1	4.5	4.5	9.1	(D)	.2	4.9
Illinois	E3	41	18	1.2	22.4	1.0	1.7	15.0	37.5	46.5	84.8	1.6	1.3	29.4
Indiana	E3	14	8	.4	6.8	.3	.6	4.6	13.7	12.4	26.3	(D)	.5	12.8
Massachusetts	E1	18	6	.3	4.7	.3	.4	3.6	15.4	7.3	22.2	.2	CC	(D)
Michigan	E1	29	6	.6	13.2	.5	.8	8.9	22.1	17.3	40.4	1.0	.9	24.0
Missouri	E1	12	4	.3	4.3	.2	.3	3.0	13.4	7.2	20.9	.1	.3	6.3
New Jersey	E5	15	6	.4	7.5	.3	.6	4.9	16.5	12.7	29.7	(D)	.4	10.7
New York	E3	35	14	.8	13.1	.7	1.2	9.4	22.7	16.2	39.1	.7	.8	15.5
North Carolina	-	7	3	.2	3.2	.2	.3	2.4	7.9	7.7	14.8	.5	(NA)	(NA)
Ohio	-	33	12	.6	10.9	.5	.9	7.5	19.1	20.3	39.2	1.0	.9	23.7
Oklahoma	E5	11	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	2.8
Pennsylvania	E1	45	20	1.9	34.2	1.4	2.4	21.1	58.0	43.9	103.0	3.8	2.2	39.7
Texas	E3	26	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.4	9.9
Virginia	-	3	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
West Virginia	E1	8	2	.3	4.4	.2	.4	3.3	7.3	6.4	13.7	(D)	AA	(D)
Wisconsin	-	12	5	.8	16.5	.6	1.0	11.3	25.3	22.2	50.9	1.7	.4	10.2
INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.														
United States	E2	358	148	14.9	264.9	11.8	22.3	180.8	478.5	427.8	916.1	27.5	17.3	413.9
Alabama	-	5	3	.2	2.2	.1	.2	1.4	3.0	3.7	6.7	.5	(NA)	(NA)
California	E6	41	14	1.0	18.0	.8	1.6	11.2	31.9	32.9	66.5	1.4	1.5	38.0
Connecticut	-	10	5	.3	4.4	.2	.5	3.0	8.2	9.3	17.2	.5	.5	12.4
Illinois	E1	39	20	1.9	35.0	1.6	3.1	25.2	52.9	50.8	104.4	4.5	1.8	42.5
Iowa	E8	8	3	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Michigan	E1	44	24	3.1	54.8	2.5	4.5	39.4	90.0	100.3	192.1	5.9	3.4	90.3
Minnesota	-	6	2	.2	4.1	.2	.3	2.8	7.6	4.2	11.9	.5	(NA)	(NA)
Missouri	-	11	5	.5	9.5	.4	.7	5.2	19.0	10.0	29.3	2.2	.4	9.1
New Jersey	E3	20	8	.4	6.8	.4	.7	4.8	9.3	9.4	18.8	(D)	.8	15.7
New York	E2	30	17	1.3	21.8	1.0	2.0	14.6	41.2	32.0	74.6	(D)	2.1	47.0
Ohio	-	31	13	2.4	51.3	1.7	3.3	34.2	106.3	81.0	191.1	3.7	2.4	66.5
Pennsylvania	E6	13	5	.3	4.2	.2	.5	3.0	8.0	6.1	14.3	.5	.2	3.1
Rhode Island	E5	16	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	3.9
Tennessee	E2	6	3	.4	5.4	.3	.5	4.0	9.9	11.4	21.5	.9	.5	9.7
Texas	-	6	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1982 and 1977—Con.

Note: For qualifications of data, see footnotes on table 1a.

¹Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

²Includes establishments with payroll at any time during year.

³Statistics for some producing States have been withheld to avoid disclosing data for individual companies. However, for States with 150 employees or more, number of establishments is shown and employment size range is indicated by one of the following symbols: AA—150 to 249 employees; BB—250 to 499 employees; CC—500 to 999 employees; EE—1,000 to 2,499 employees; FF—2,500 employees or more.

⁴Beginning in 1982, all respondents were requested to report their inventories at cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, data for inventories and value added by manufacture are not comparable to prior-year data.

Table 3a. Summary Statistics for the Industry: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Gray iron foundries (SIC 3321)	Malleable iron foundries (SIC 3322)	Steel investment foundries (SIC 3324)	Steel foundries, n.e.c. (SIC 3325)	Aluminum foundries (SIC 3361)	Brass, bronze, and copper foundries (SIC 3362)	Nonferrous foundries, n.e.c. (SIC 3369)
Companies ¹ ----- number-----	800	46	117	291	994	487	351
All establishments ² ----- do-----	925	50	132	331	1 052	499	358
With 1 to 19 employees ----- do-----	290	19	24	102	575	337	210
With 20 to 99 employees ----- do-----	412	12	61	116	347	147	112
With 100 employees or more ----- do-----	223	19	47	113	130	15	36
All employees:							
Average for year ----- 1,000-----	97.3	6.5	16.8	36.9	49.2	11.8	14.9
Annual payroll ³ ----- mil. dol.-----	1 965.0	135.7	299.4	713.0	926.2	201.8	264.9
Production workers:							
Average for year ----- 1,000-----	78.2	4.8	12.6	28.4	40.2	9.2	11.8
March ----- do-----	87.1	5.4	13.8	34.3	41.9	9.9	12.3
May ----- do-----	82.0	5.1	13.2	30.4	41.3	9.5	11.9
August ----- do-----	76.5	4.5	12.1	26.7	39.8	9.0	11.7
November ----- do-----	67.3	4.0	11.5	22.0	37.7	8.4	11.3
Hours ----- millions-----	139.8	8.2	24.4	49.6	76.2	16.6	22.3
January to March ----- do-----	39.7	2.4	6.9	16.2	19.7	4.6	5.7
April to June ----- do-----	37.9	2.3	6.4	13.2	19.8	4.4	5.7
July to September ----- do-----	33.1	1.8	5.5	10.6	18.6	3.8	5.5
October to December ----- do-----	29.0	1.6	5.5	9.6	18.0	3.8	5.4
Wages ----- mil. dol.-----	1 463.0	89.3	197.2	498.8	688.6	138.5	180.8
Value added by manufacture ⁴ ----- do-----	3 310.5	206.3	635.7	1 209.0	1 612.6	381.9	478.5
Cost of materials, etc. ⁵ ----- do-----	2 840.4	112.9	363.3	826.3	1 384.0	311.6	427.8
Materials, parts, containers, etc., consumed ----- do-----	2 082.8	66.2	282.4	607.7	1 102.2	263.0	341.0
Resales ----- do-----	131.7	.5	3.7	18.6	27.2	6.8	6.7
Fuels consumed ⁶ ----- do-----	285.5	16.7	13.2	59.8	85.7	11.6	17.3
Purchased electric energy ⁷ ----- do-----	308.1	27.6	26.5	103.8	72.1	17.5	18.8
Contract work ----- do-----	32.2	2.0	37.5	36.4	96.8	12.6	44.0
Value of shipments, including resales ----- do-----	6 202.2	323.2	1 024.6	2 091.4	3 013.6	702.2	916.1
Value of resales ----- do-----	147.8	.4	4.2	27.2	29.5	7.9	8.8
Manufacturers' inventories (see tables 3b and 3c)							
Capital expenditures for plant and equipment ⁸ ----- do-----	367.7	12.7	35.5	105.1	138.4	21.5	30.6
New capital expenditures ----- do-----	348.0	11.9	32.9	99.6	126.4	19.3	27.5
New buildings and other structures ----- do-----	32.6	.4	6.6	20.7	23.0	2.9	3.9
New machinery and equipment ----- do-----	315.5	11.5	26.3	78.9	103.4	16.4	23.5
Used capital expenditures ----- do-----	19.7	.8	2.7	5.5	12.0	2.3	3.2
Primary product specialization ratio ⁹ ----- percent-----	94	89	91	90	88	88	86
Coverage ratio ¹⁰ ----- do-----	91	77	96	92	92	85	79

¹For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

²Includes establishments with payroll at any time during year.

³Data on supplemental labor costs are not included in annual payroll, but are shown in table 3d.

⁴Value added by manufacture is computed using inventory data reported on a cost or market basis prior to any adjustment to LIFO cost. See table 3b, footnote 1 for further explanation.

⁵Data on purchased services for the repair of buildings and machinery and for communication services are not included in cost of materials, etc., but are shown in table 3d.

⁶Data on purchased fuels by type were not collected for 1982. See MC82-S-4, Fuels and Electric Energy Consumed, for 1981 data on purchased fuels by type.

⁷Data on quantity of electric energy used for heat and power are included in table 3d.

⁸Data on capital expenditures for new machinery and equipment by type, depreciable assets, retirements, rental payments, and depreciation are included in table 3d.

⁹Represents ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for establishments classified in industry.

¹⁰Represents ratio of primary products shipped by establishments classified in industry to total shipments of such products by all manufacturing establishments, wherever classified.

Table 3b. Value of Inventories for the Industry: End of 1981 and 1982

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Gray iron foundries (SIC 3321)		Malleable iron foundries (SIC 3322)		Steel investment foundries (SIC 3324)		Steel foundries, n.e.c. (SIC 3325)	
	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982
Total Inventories¹	842.4	750.0	30.8	25.3	194.3	162.6	389.0	313.2
Detail by method of valuation:								
Subject to LIFO costing ²	307.8	262.4	8.5	7.1	36.5	31.3	168.2	140.3
LIFO reserve	111.9	101.3	3.0	2.6	12.2	9.6	55.3	41.9
LIFO value	195.9	161.0	5.5	4.6	24.2	21.7	112.9	98.4
Not subject to LIFO costing	453.4	417.3	19.0	15.5	132.3	110.6	175.8	140.4
Valuation method not reported ³	73.3	63.5	2.9	2.6	25.6	20.7	44.6	32.3
Amount subject to LIFO reported without associated reserve and value ⁴	7.9	6.8	.4	.1	-	-	.5	.2
Detail by stage of fabrication:								
Finished goods	338.4	318.3	6.3	4.8	11.4	6.2	115.6	105.3
Work in process	208.8	177.5	15.5	13.1	118.2	97.8	157.0	111.3
Materials and supplies	295.1	254.2	9.0	7.4	64.7	58.6	116.4	96.6
Item	Aluminum foundries (SIC 3361)		Brass, bronze, and copper foundries (SIC 3362)		Nonferrous foundries, n.e.c. (SIC 3369)			
	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982
Total Inventories¹	328.8	281.1	109.4	92.7	137.9	119.2		
Detail by method of valuation:								
Subject to LIFO costing ²	60.2	50.4	40.5	31.7	51.8	49.5		
LIFO reserve	17.9	14.2	14.0	11.2	15.4	12.8		
LIFO value	42.3	36.2	26.5	20.5	36.5	36.8		
Not subject to LIFO costing	207.1	180.5	29.2	25.9	46.5	35.5		
Valuation method not reported ³	59.5	48.5	37.8	33.4	39.0	33.5		
Amount subject to LIFO reported without associated reserve and value ⁴	1.9	1.7	1.9	1.6	.6	.6		
Detail by stage of fabrication:								
Finished goods	58.6	53.5	33.5	30.6	21.4	17.1		
Work in process	147.0	135.0	35.8	30.0	65.4	59.8		
Materials and supplies	123.1	92.6	40.0	32.0	51.2	42.2		

¹Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (LIFO, FIFO, market, to name a few). In 1982, all respondents were requested to report inventories at cost or market. LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve. For further explanation, see inventories in appendixes.

²Only includes data reported by respondents who (a) indicated amount of inventories subject to LIFO cost, and (b) provided sufficient information to determine associated LIFO reserve and value figures.

³Includes data estimated for nonresponse and nonmail administrative records and data reported by respondents who provided total inventory figures without other information.

⁴Includes data reported by respondents who indicated their inventories were subject to LIFO cost, but did not provide associated LIFO reserve and value figures.

Table 3c. Inventories by Specific Method of Valuation for the Industry: End of 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Gray iron foundries (SIC 3321)		Malleable iron foundries (SIC 3322)		Steel investment foundries (SIC 3324)		Steel foundries, n.e.c. (SIC 3325)	
	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)
Total Inventories	100.0	(X)	100.0	(X)	100.0	(X)	100.0	(X)
Last-In, First-Out (LIFO) methods	35.0	(X)	28.2	(X)	19.3	(X)	44.8	(X)
Non-LIFO methods	55.6	(X)	61.2	(X)	68.0	(X)	44.8	(X)
Cost basis:								
First-In, First-Out (FIFO)	16.5	.6	15.3	2.4	21.8	1.9	18.0	2.8
Average cost	22.9	.8	22.3	4.1	9.6	1.5	12.2	1.4
Specific or actual cost	6.0	.9	1.5	.2	9.1	.7	2.0	.3
Standard cost	7.9	.9	11.8	2.7	25.5	1.2	10.4	1.2
Other	1.7	.2	10.3	1.2	2.0	.1	1.5	.4
Market basis:								
Market lower than cost	.6	(Z)	(Z)	(Z)	(Z)	(Z)	(S)	(S)
Market always used	.1	(Z)	(Z)	(Z)	(Z)	(Z)	(S)	(S)
Valuation method not reported	8.5	(X)	10.1	(X)	12.7	(X)	10.3	(X)
Amount subject to LIFO reported without associated reserve and value	.9	(X)	.5	(X)	(Z)	(X)	.1	(X)

See footnotes at end of table.

Table 3c. Inventories by Specific Method of Valuation for the Industry: End of 1982—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aluminum foundries (SIC 3361)		Brass, bronze, and copper foundries (SIC 3362)		Nonferrous foundries, n.e.c. (SIC 3369)	
	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)
Total inventories	100.0	(X)	100.0	(X)	100.0	(X)
Last-In, First-Out (LIFO) methods	17.9	(X)	34.2	(X)	41.6	(X)
Non-LIFO methods	64.2	(X)	28.0	(X)	29.8	(X)
Cost basis:						
First-In, First-Out (FIFO)	22.7	2.3	8.9	2.2	11.8	2.7
Average cost	10.5	4.6	.6	.1	(S)	(S)
Specific or actual cost	13.3	1.4	6.3	1.9	2.9	.9
Standard cost	14.4	1.3	7.9	2.2	8.6	2.7
Other	1.6	.4	(S)	(S)	(S)	(S)
Market basis:						
Market lower than cost	.7	.2	1.6	.6	(S)	(S)
Market always used	.9	.2	.4	.1	2.3	1.1
Valuation method not reported	17.3	(X)	36.1	(X)	28.2	(X)
Amount subject to LIFO reported without associated reserve and value	.6	(X)	1.7	(X)	.5	(X)

Note: The percentages shown for the LIFO and non-LIFO totals and the categories "valuation method not reported" and "amount subject to LIFO reported..." are based on the census universe estimates included in table 3b. The percentages shown for the specific non-LIFO methods of valuation (e.g., FIFO, etc.) are based on a representative sample of establishments included in the annual survey of manufactures (ASM) panel for 1982 (see appendixes for description of ASM). The absolute standard error of each of the ASM estimates is shown above.

Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Gray iron foundries (SIC 3321)		Malleable iron foundries (SIC 3322)		Steel investment foundries (SIC 3324)		Steel foundries, n.e.c. (SIC 3325)	
	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)
Supplemental labor costs:								
Total	672.5	1	45.8	3	76.9	2	244.5	3
Legal costs	217.5	2	14.0	6	34.9	2	85.4	2
Voluntary costs	455.0	2	31.9	3	42.1	3	159.1	3
Purchased services:								
Cost of purchased services for the repair of—								
Buildings and other structures	12.5	10	.3	27	2.1	9	23.2	1
Response coverage ratio (percent) ²	76.9	(X)	86.3	(X)	86.0	(X)	61.1	(X)
Machinery	105.3	5	4.0	37	8.7	12	612.4	1
Response coverage ratio (percent) ²	83.1	(X)	86.3	(X)	89.3	(X)	66.7	(X)
Cost of purchased communication services	35.3	5	.5	26	1.9	6	58.3	5
Response coverage ratio (percent) ²	76.4	(X)	60.5	(X)	64.9	(X)	70.1	(X)
Electric energy used for heat and power:								
Purchased:								
Quantity (million kWh)	5 985.1	1	562.6	4	435.3	2	1 993.2	3
Cost	308.1	(X)	27.6	(X)	26.5	(X)	103.8	(X)
Generated less sold (million kWh)	20.5	13	—	—	(S)	(S)	(S)	(S)
Gross book value of depreciable assets:								
Total:								
Beginning of year	5 323.8	2	277.9	10	272.0	4	1 382.9	3
New capital expenditures	331.6	3	12.7	18	32.0	12	94.0	6
Used capital expenditures	22.8	27	.5	9	2.5	5	4.8	6
Retirements	187.8	12	6.1	10	12.5	11	55.2	7
End of year	5 490.4	2	285.0	10	294.0	4	1 426.6	3
Buildings and other structures:								
Beginning of year	1 185.3	2	54.2	20	70.7	4	329.3	3
New capital expenditures	32.1	9	.6	33	6.6	13	18.8	5
Used capital expenditures	4.8	41	—	—	.6	1	.5	20
Retirements	26.7	20	.3	24	1.0	19	12.7	5
End of year	1 195.5	2	54.5	20	77.0	4	335.8	3
Machinery and equipment:								
Beginning of year	4 138.5	2	223.6	8	201.3	4	1 053.6	3
New capital expenditures	299.5	3	12.2	17	25.3	13	75.2	7
Automobiles, trucks, etc., for highway use	5.2	8	2.6	1	.2	10	1.5	31
Computers and peripheral data processing equipment	3.5	4	.8	1	.3	14	.7	26
All other	277.3	3	5.4	10	23.5	14	70.4	6
New machinery and equipment, n.s.k. ³	13.4	(S)	3.4	(S)	1.3	(S)	2.7	(S)
Used capital expenditures	18.0	28	.5	9	1.9	7	4.4	6
Retirements	161.1	11	5.8	9	11.5	10	42.5	8
End of year	4 294.9	2	230.4	8	217.0	4	1 090.8	3
Rental payments:								
Total	26.9	8	.6	4	5.6	11	11.9	6
Buildings and other structures	6.8	26	(Z)	1	2.1	9	4.6	11
Machinery and equipment	20.2	5	.6	4	3.5	16	7.4	6
Depreciation charges during 1982:								
Total	385.7	2	17.4	11	22.7	4	89.9	3
Buildings and other structures	53.6	5	2.2	29	3.8	5	12.2	3
Machinery and equipment	332.1	2	15.2	9	18.9	5	77.6	3

See footnotes at end of table.

Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Aluminum foundries (SIC 3361)		Brass, bronze, and copper foundries (SIC 3362)		Nonferrous foundries, n.e.c. (SIC 3369)	
	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)
Supplemental labor costs:						
Total	236.1	1	46.9	6	60.4	4
Legal costs	94.8	2	20.2	6	29.9	7
Voluntary costs	141.4	2	26.7	9	30.5	6
Purchased services:						
Cost of purchased services for the repair of—						
Buildings and other structures	4.6	10	1.2	29	1.4	24
Response coverage ratio (percent) ²	64.3	(X)	60.9	(X)	66.1	(X)
Machinery	30.0	8	5.1	25	6.5	15
Response coverage ratio (percent)	68.2	(X)	70.0	(X)	73.7	(X)
Cost of purchased communication services	73.8	1	2.3	19	1.9	17
Response coverage ratio (percent)	67.8	(X)	73.0	(X)	72.1	(X)
Electric energy used for heat and power:						
Purchased:						
Quantity (million kWh)	1 505.3	2	268.4	7	307.5	4
Cost	72.1	(X)	17.5	(X)	18.8	(X)
Generated less sold (million kWh)	—	—	.2	99	—	—
Gross book value of depreciable assets:						
Total:						
Beginning of year	1 461.7	2	284.8	17	279.3	6
New capital expenditures	128.4	6	22.9	25	23.0	15
Used capital expenditures	8.7	11	1.5	34	1.6	55
Retirements	50.9	9	30.2	46	35.8	13
End of year	1 547.9	2	278.9	16	268.1	6
Buildings and other structures:						
Beginning of year	358.0	3	98.8	34	67.2	12
New capital expenditures	24.1	12	4.8	47	3.3	20
Used capital expenditures	2.7	22	.3	78	.1	15
Retirements	10.4	18	4.6	46	7.7	16
End of year	374.3	3	99.2	35	62.8	14
Machinery and equipment:						
Beginning of year	1 103.7	2	186.0	10	212.1	5
New capital expenditures	104.3	6	18.1	23	19.7	17
Automobiles, trucks, etc., for highway use	2.9	11	.5	34	1.1	21
Computers and peripheral data processing equipment	2.0	11	.1	81	1.6	72
All other	74.1	5	14.2	27	14.8	15
New machinery and equipment, n.s.k. ³	25.2	(S)	3.4	(S)	2.3	(S)
Used capital expenditures	6.1	8	1.2	37	1.5	57
Retirements	40.5	7	25.6	47	28.1	16
End of year	1 173.6	2	179.7	9	205.3	6
Rental payments:						
Total	20.4	7	3.5	28	9.7	17
Buildings and other structures	10.4	13	2.0	43	7.0	21
Machinery and equipment	9.9	7	1.5	30	2.7	21
Depreciation charges during 1982:						
Total	116.6	2	20.1	19	21.9	6
Buildings and other structures	15.5	3	4.6	47	3.2	15
Machinery and equipment	101.0	2	15.5	13	18.7	6

Note: Data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used expenditures are also shown in table 3a. Data in table 3a are census universe totals and may differ from annual survey of manufactures (ASM) sample estimates shown in this table. Data in this table represent best estimates of year-to-year change as measured by the continuing ASM sample. However, they are subject to sampling error and, hence, as estimates of level, are not as reliable as universe figures shown in table 3a.

¹For description of relative standard error of estimate, see Qualifications of the Data in appendixes.

²Measure of extent to which respondents reported each item. Derived for each item by calculating the ratio of weighted employment for those sample establishments that reported the specific inquiry to weighted total employment for all sample establishments classified in industry. (See appendixes for explanation of sample weight.)

³Represents total machinery and equipment expenditures for establishments that did not break down their expenditures by specific type.

Table 4. Industry Statistics by Employment Size of Establishment: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E ¹	All establish- ments (no.)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year inven- tories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3321, GRAY IRON FOUNDRIES												
Total	—	925	97.3	1 965.0	78.2	139.8	1 463.0	3 310.5	2 840.4	6 202.2	348.0	750.0
Establishments with an average of—												
1 to 4 employees	E9	118	.2	3.2	.2	.3	2.8	6.9	5.6	12.8	.5	1.4
5 to 9 employees	E4	53	.4	5.3	.3	.6	4.1	12.1	9.3	21.5	.7	2.8
10 to 19 employees	E5	119	1.7	27.1	1.4	2.7	20.1	42.1	31.4	75.4	2.9	7.7
20 to 49 employees	E2	237	7.6	120.4	6.3	11.3	88.1	201.9	140.6	348.4	10.8	33.3
50 to 99 employees	E1	175	12.6	211.2	10.2	18.6	153.9	352.2	287.5	646.7	28.2	67.9
100 to 249 employees	—	143	21.9	393.1	17.3	30.2	281.2	629.7	577.9	1 223.0	58.5	152.4
250 to 499 employees	—	48	15.5	298.2	12.1	22.5	216.6	533.4	507.6	1 046.9	60.3	165.5
500 to 999 employees	—	22	14.7	321.7	11.8	20.6	242.6	490.2	407.9	905.7	36.3	106.4
1,000 to 2,499 employees	—	5	7.1	142.6	5.7	9.4	103.8	244.2	179.6	420.0	11.4	54.4
2,500 employees or more	—	5	15.6	442.1	12.8	23.7	349.8	797.8	692.9	1 501.7	138.5	158.1
Covered by administrative records ²	E9	157	1.2	14.2	1.0	1.9	11.2	24.8	20.7	46.1	2.1	5.3

See footnotes at end of table.

Table 4. Industry Statistics by Employment Size of Establishment: 1982—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E1	All establish- ments (no.)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expendi- tures (million dollars)	End-of-year inventories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3322, MALLEABLE IRON FOUNDRIES												
Total-----	E1	50	6.5	135.7	4.8	8.2	89.3	206.3	112.9	323.2	11.9	25.3
Establishments with an average of—												
1 to 4 employees-----	E9	12	(Z)	.2	(Z)	(Z)	.1	.3	.2	.5	.1	.1
5 to 9 employees-----	E9	4	(Z)	.4	(Z)	(Z)	.3	.8	.4	1.2	.1	.1
10 to 19 employees-----	E9	3	(Z)	.6	(Z)	.1	.4	1.1	.6	1.8	.3	.2
20 to 49 employees-----	E5	6	.2	4.0	.2	.4	3.0	8.0	4.9	12.9	.5	1.0
50 to 99 employees-----	-	6	.5	6.9	.3	.5	4.0	11.3	5.7	17.8	1.1	1.8
100 to 249 employees-----	E2	13	1.8	32.3	1.4	2.4	23.1	53.1	28.1	82.8	2.1	9.3
250 to 499 employees-----	-	4	3.9	91.3	2.8	4.7	58.5	131.6	73.0	206.4	7.7	12.8
500 to 999 employees-----	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
1,000 to 2,499 employees-----	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ² -----	E9	12	.1	.8	.1	.1	.6	1.7	.9	2.7	.1	.2
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES												
Total-----	-	132	16.8	299.4	12.6	24.4	197.2	635.7	363.3	1 024.6	32.9	162.6
Establishments with an average of—												
1 to 4 employees-----	E9	8	(Z)	.3	(Z)	(Z)	.2	.7	.5	1.2	(Z)	.4
5 to 9 employees-----	E3	3	(Z)	.3	(Z)	(Z)	.2	.7	1.0	1.8	(Z)	.3
10 to 19 employees-----	E3	13	.2	2.9	.1	.3	2.0	6.4	3.4	9.8	.2	1.3
20 to 49 employees-----	E2	35	1.1	16.3	.9	1.7	10.9	29.8	19.3	49.7	1.7	5.2
50 to 99 employees-----	E2	26	2.0	30.6	1.6	3.2	21.4	70.0	36.2	108.1	2.7	15.7
100 to 249 employees-----	-	33	5.4	89.8	4.3	8.3	61.3	168.5	104.8	276.1	13.5	42.6
250 to 499 employees-----	-	7	2.5	51.0	1.9	3.8	35.2	125.1	53.3	179.4	6.2	22.8
500 to 999 employees-----	-	6	5.6	108.1	3.8	7.1	66.0	234.4	144.8	398.5	8.6	74.5
1,000 to 2,499 employees-----	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ² -----	E9	12	.1	1.1	.1	.1	.8	2.4	1.5	3.9	.1	.8
INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.												
Total-----	E1	331	36.9	713.0	28.4	49.6	498.8	1 209.0	826.3	2 091.4	99.6	313.2
Establishments with an average of—												
1 to 4 employees-----	E7	37	.1	1.3	.1	.1	1.0	2.8	2.2	5.4	.6	1.7
5 to 9 employees-----	E8	38	.2	3.6	.2	.4	2.8	7.0	4.8	12.2	.3	2.8
10 to 19 employees-----	E5	27	.4	7.3	.3	.6	5.0	16.1	15.9	32.4	1.0	6.0
20 to 49 employees-----	E3	71	2.3	38.2	1.8	3.5	27.1	67.2	48.4	117.5	4.6	12.2
50 to 99 employees-----	E2	45	3.2	60.4	2.5	4.7	42.4	95.5	73.6	174.4	7.4	20.8
100 to 249 employees-----	E1	70	11.1	207.7	8.7	16.0	148.1	393.9	273.8	671.3	24.2	86.4
250 to 499 employees-----	E1	29	9.6	195.5	7.4	12.8	138.2	342.6	219.1	573.5	36.2	85.2
500 to 999 employees-----	-	13	9.9	199.0	7.4	11.5	134.1	283.9	188.5	504.5	25.3	98.1
1,000 to 2,499 employees-----	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ² -----	E9	60	.5	6.7	.4	.8	5.2	12.2	8.7	21.4	.9	4.0
INDUSTRY 3361, ALUMINUM FOUNDRIES												
Total-----	E1	1 052	49.2	926.2	40.2	76.2	688.6	1 612.6	1 384.0	3 013.6	126.4	281.1
Establishments with an average of—												
1 to 4 employees-----	E8	192	.4	5.5	.4	.7	5.1	11.2	9.7	21.0	.6	1.8
5 to 9 employees-----	E6	155	1.1	14.6	.9	1.7	12.1	24.8	21.6	46.7	1.1	4.0
10 to 19 employees-----	E3	228	3.2	47.2	2.7	4.9	37.0	82.0	58.1	140.8	4.7	12.2
20 to 49 employees-----	E1	228	7.2	113.3	6.0	11.2	82.3	198.1	166.9	373.9	12.0	31.1
50 to 99 employees-----	E1	119	8.4	141.0	6.9	12.8	102.7	260.3	214.5	477.8	23.7	39.9
100 to 249 employees-----	-	97	14.7	281.8	11.9	22.9	203.1	499.9	409.9	912.4	34.1	86.6
250 to 499 employees-----	-	25	8.3	160.7	6.5	12.3	114.1	299.7	234.3	533.0	21.9	69.8
500 to 999 employees-----	-	8	5.9	162.1	4.8	9.6	132.4	236.8	269.0	508.0	28.3	35.7
Covered by administrative records ² -----	E9	266	1.4	16.4	1.2	2.4	13.2	28.8	27.5	56.8	1.8	5.3
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES												
Total-----	E2	499	11.8	201.8	9.2	16.6	138.5	381.9	311.6	702.2	19.3	92.7
Establishments with an average of—												
1 to 4 employees-----	E8	100	.2	2.8	.2	.3	2.2	6.0	4.7	10.8	.1	1.1
5 to 9 employees-----	E3	107	.8	10.8	.6	1.1	8.9	20.3	16.8	37.4	.7	3.9
10 to 19 employees-----	E2	130	1.8	26.8	1.4	2.5	19.6	48.3	41.8	90.9	2.8	8.4
20 to 49 employees-----	E2	107	3.4	56.9	2.7	4.9	39.2	111.3	92.7	205.3	6.5	22.5
50 to 99 employees-----	E2	40	2.8	48.2	2.3	4.2	33.3	92.7	88.7	183.9	3.3	22.0
100 to 249 employees-----	E1	11	1.5	28.1	1.1	2.0	18.1	64.4	39.2	104.2	2.8	13.6
250 to 499 employees-----	-	3	1.4	28.2	.9	1.6	17.2	38.7	27.7	69.7	3.0	21.1
500 to 999 employees-----	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ² -----	E9	116	.5	5.3	.4	.8	3.8	10.5	9.1	19.9	.3	2.2
INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.												
Total-----	E2	358	14.9	264.9	11.8	22.3	180.8	478.5	427.8	916.1	27.5	119.2
Establishments with an average of—												
1 to 4 employees-----	E8	81	.2	2.2	.1	.3	1.8	5.1	5.5	10.8	.3	1.6
5 to 9 employees-----	E7	56	.4	5.6	.3	.6	4.1	10.7	9.4	20.2	.5	2.4
10 to 19 employees-----	E3	73	1.0	15.0	.8	1.5	10.3	24.7	32.0	57.0	2.2	5.8
20 to 49 employees-----	E2	75	2.4	41.5	2.0	3.6	27.7	75.3	60.0	136.5	4.7	18.4
50 to 99 employees-----	E1	37	2.6	43.7	2.1	4.2	29.2	83.2	69.6	152.9	4.7	15.1
100 to 249 employees-----	E1	28	4.3	75.7	3.4	6.6	51.6	122.2	141.8	268.3	8.2	32.0
250 to 499 employees-----	E2	5	4.1	81.3	3.1	5.5	56.1	157.2	109.5	270.5	6.9	44.0
500 to 999 employees-----	-	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ² -----	E9	104	.6	6.3	.4	.9	4.3	12.1	11.1	23.5	.8	3.1

See footnotes at end of table.

Table 4. Industry Statistics by Employment Size of Establishment: 1982—Con.

Note: For qualifications of data, see footnotes on table 1a. Data shown as a (D) are included in underscored figures above.

¹Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

²Report forms were not mailed to small single-unit companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1982 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective size classes shown.

Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1982

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. Statistics for establishments with specialization ratios of less than 75 percent are included in total lines but are not shown as a separate class. In addition, data may not be shown for various reasons; e.g., to avoid disclosing data for individual companies. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry or product class code	Industry or product class by percent of specialization	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3321	Gray Iron foundries: Entire industry _____ Establishments with 75 percent specialization or more _____	925 863	97.3 86.8	1 965.0 1 756.4	78.2 70.2	139.8 125.7	1 463.0 1 315.1	3 310.5 2 983.6	2 840.4 2 495.4	6 202.2 5 535.7	348.0 310.8
33211	Ductile iron pressure pipe and fittings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	21 17	7.6 (D)	156.8 (D)	5.9 (D)	11.5 (D)	113.5 (D)	312.2 (D)	411.0 (D)	723.0 (D)	29.5 (D)
33212	Other ductile iron castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	98 55	14.0 7.3	267.4 135.1	11.0 5.8	19.7 9.9	190.8 96.3	398.4 210.8	332.1 173.3	740.1 388.7	47.4 34.3
33216	Gray iron molds and stools for heavy steel ingots: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	16 15	2.0 (D)	48.3 (D)	1.4 (D)	2.2 (D)	31.3 (D)	75.4 (D)	162.0 (D)	250.8 (D)	7.1 (D)
33217	Cast iron pressure pipe and fittings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	23 17	3.2 (D)	49.6 (D)	2.7 (D)	4.6 (D)	36.6 (D)	99.7 (D)	70.7 (D)	169.1 (D)	4.0 (D)
33218	Cast iron soil pipe and fittings, gray iron: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	14 7	5.3 3.4	91.6 60.8	4.3 2.7	7.7 4.4	67.8 44.0	124.2 89.1	145.3 85.0	262.4 168.9	14.9 10.5
33219	Other gray iron castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	434 348	59.6 41.6	1 278.4 884.3	48.2 33.8	85.4 59.8	966.6 666.2	2 177.9 1 464.0	1 624.5 1 003.7	3 836.9 2 497.4	235.6 150.7
3322	Malleable Iron foundries: Entire industry _____ Establishments with 75 percent specialization or more _____	50 39	6.5 4.5	135.7 102.5	4.8 3.3	8.2 5.8	89.3 67.2	206.3 156.2	112.9 89.8	323.2 247.9	11.9 7.2
33221	Standard malleable castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	26 17	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
33222	Pearlitic malleable castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	2 1	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)	(D) (D)
3324	Steel Investment foundries: Entire industry _____ Establishments with 75 percent specialization or more _____	132 116	16.8 15.0	299.4 265.7	12.6 11.3	24.4 22.1	197.2 177.8	635.7 557.9	363.3 319.7	1 024.6 902.4	32.9 29.5
3325	Steel foundries, n.e.c.: Entire industry _____ Establishments with 75 percent specialization or more _____	331 294	36.9 31.8	713.0 599.5	28.4 24.5	49.6 42.9	498.8 420.6	1 209.0 1 030.2	826.3 696.5	2 091.4 1 762.4	99.6 89.2
33252	Carbon steel castings, except investment: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	109 68	18.8 11.8	356.2 215.2	14.5 9.2	24.1 15.0	244.4 149.0	583.2 373.6	394.9 249.6	1 020.9 643.7	47.1 35.7
33254	High alloy steel castings, except investment: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	64 44	8.0 5.3	154.9 98.9	6.2 4.1	11.4 7.6	110.0 70.7	255.9 164.4	206.7 137.8	467.7 303.5	22.9 14.6
33255	Other alloy steel castings, except investment: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	46 26	8.6 2.7	182.2 52.3	6.5 2.1	11.8 3.8	129.4 37.9	331.5 89.1	195.6 66.3	534.3 156.5	26.4 12.5
3361	Aluminum foundries: Entire industry _____ Establishments with 75 percent specialization or more _____	1 052 899	49.2 38.3	926.2 726.4	40.2 31.3	76.2 59.5	688.6 542.5	1 612.6 1 275.5	1 384.0 1 109.4	3 013.6 2 398.4	126.4 105.9
33611	Aluminum and aluminum-base alloy die castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	245	24.2	496.9	19.6	37.3	371.2	850.7	795.6	1 655.1	79.3
33612	Other aluminum and aluminum-base castings: Establishments with this product class primary _____ Establishments with 75 percent specialization or more in class _____	180	14.9	284.5	12.2	22.8	211.7	544.2	469.4	1 020.8	41.0
3362	Brass, bronze, and copper foundries: Entire industry _____ Establishments with 75 percent specialization or more _____	433 340	21.8 16.1	386.8 281.9	17.8 13.1	33.5 24.8	283.6 205.4	688.9 509.1	525.0 386.0	1 220.9 900.7	42.7 30.3

See footnotes at end of table.

Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1982—Con.

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. Statistics for establishments with specialization ratios of less than 75 percent are included in total lines but are not shown as a separate class. In addition, data may not be shown for various reasons; e.g., to avoid disclosing data for individual companies. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry or product class code	Industry or product class by percent of specialization	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3369	Nonferrous foundries, n.e.c.: Entire industry -----	358	14.9	264.9	11.8	22.3	180.8	478.5	427.8	916.1	27.5
	Establishments with 75 percent specialization or more -----	316	10.5	189.7	8.2	15.6	124.2	348.8	313.4	671.0	19.8
33691	Zinc and zinc-base alloy castings: Establishments with this product class primary -----	123	8.7	153.0	7.1	13.2	105.8	266.6	256.5	526.9	16.6
	Establishments with 75 percent specialization or more in class -----	96	5.5	96.9	4.4	8.6	64.9	172.5	173.1	346.8	9.5
33692	Magnesium and magnesium-base alloy: Establishments with this product class primary -----	17	1.6	26.9	1.3	2.5	19.7	49.3	38.2	86.7	2.5
	Establishments with 75 percent specialization or more in class -----	12	.3	6.8	.3	.5	5.0	11.5	7.7	19.7	.5
33693	Other nonferrous castings: Establishments with this product class primary -----	43	3.0	64.7	2.1	4.0	41.3	124.9	99.5	230.3	6.1
	Establishments with 75 percent specialization or more in class -----	33	2.7	59.7	1.9	3.6	37.9	116.3	94.1	216.1	5.8

Note: For qualifications of data, see footnotes on table 1a.

Table 5b. Industry-Product Analysis—Value of Shipments and Primary Product Shipments, Specialization and Coverage Ratios for the Industry: 1982 and Earlier Census Years

[An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work. Columns A-D show this product pattern for an industry, and column E shows primary product specialization ratio. The extent to which an industry's primary products are shipped by establishments classified in and out of an industry is shown in columns F-H and coverage ratio is shown in column I. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and product group code	Industry and census year	Value of shipments					Value of primary product shipments			
		Total (million dollars)	Primary products (million dollars)	Secondary products (million dollars)	Miscellaneous receipts (million dollars)	Primary product specialization ratio Col. B ÷ Col. B+C (percent)	Total made in all industries (million dollars)	Made in this industry (million dollars)	Made in other industries (million dollars)	Coverage ratio Col. B ÷ Col. F (percent)
3321	Gray iron foundries -----	6 202.2	5 691.2	339.5	171.5	94	6 287.7	5 691.2	596.4	91
	1977--	7 388.7	6 929.2	303.8	155.7	96	7 835.2	6 929.2	906.2	88
	1972--	3 875.3	3 507.1	232.4	135.8	94	4 033.8	3 507.1	526.7	87
3322	Malleable iron foundries -----	323.2	286.0	36.2	1.0	89	370.8	286.0	84.8	77
	1977--	721.9	620.1	99.6	2.2	86	669.5	620.1	49.4	93
	1972--	507.9	439.0	65.2	3.7	87	484.8	439.0	45.8	91
3324	Steel investment foundries -----	1 024.6	921.9	91.8	10.9	91	963.6	921.9	41.7	96
	1977--	407.5	375.4	30.0	2.1	93	434.1	375.4	58.7	86
	1972--	262.2	224.5	35.4	2.3	86	237.7	224.5	13.2	94
3325	Steel foundries, n.e.c. -----	2 091.4	1 840.4	194.6	56.4	90	2 009.7	1 840.4	169.3	92
	1977--	2 312.1	2 011.3	257.7	43.1	87	2 205.8	2 011.3	194.4	91
	1972--	1 067.4	922.0	116.3	29.1	89	1 050.3	922.0	128.3	88
3361	Aluminum foundries -----	3 013.6	2 591.1	364.7	57.8	88	2 810.8	2 591.1	219.7	92
	1977--	2 459.1	2 103.1	321.3	34.7	87	2 294.2	2 103.1	191.1	92
	1972--	1 269.9	1 047.4	205.8	16.7	84	1 172.3	1 047.4	124.9	89
3362	Brass, bronze, and copper foundries-----	702.2	606.3	82.7	13.1	88	714.7	606.3	108.4	85
	1977--	553.3	456.4	82.3	14.6	85	615.6	456.4	159.2	74
	1972--	465.3	377.0	73.0	15.3	84	462.9	377.0	85.9	81
3369	Nonferrous foundries, n.e.c. -----	916.1	778.0	126.8	11.3	86	987.0	778.0	209.0	79
	1977--	813.7	680.4	118.4	14.9	85	878.1	680.4	197.7	77
	1972--	588.6	473.8	100.0	14.8	83	603.5	473.8	129.7	79

¹Minimum percentage; exact percentage withheld to avoid disclosing data for individual companies.

²Relationships are not meaningful because of predominance of miscellaneous receipts, particularly receipts for contract and commission work on materials owned by others.

Table 5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982

[Million dollars. Table shows where products of an industry (referred to as primary and listed in table 6a) are made and what products are made by establishments classified in an industry. Read down an industry column to find what products are produced in an industry. Only those product groups that have at least \$2 million in shipments from establishments classified in one of industries included in this chapter are shown. Read across to determine where products of industries in this chapter are produced. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column. Specified "Other industries" are listed in table 5c-2 if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see explanatory text. For explanation of terms, see appendixes]

1982 product code	Product group, product class, and miscellaneous receipts	All industries	Gray iron foundries (SIC 3321)	Malleable iron foundries (SIC 3322)	Steel investment foundries (SIC 3324)	Steel foundries, n.e.c. (SIC 3325)	Aluminum foundries (SIC 3361)	Brass, bronze, and copper foundries (SIC 3362)	Nonferrous foundries, n.e.c. (SIC 3369)	Other industries
	Total	(X)	6 202.2	323.2	1 024.6	2 091.4	3 013.6	702.2	916.1	(X)
	Primary products	(X)	5 691.2	286.0	921.9	1 840.4	2 591.1	606.3	778.0	(X)
	Secondary products	(X)	339.5	36.2	91.8	194.6	364.7	82.7	126.8	(X)
	Miscellaneous receipts	(X)	171.5	1.0	10.9	56.4	57.8	13.1	11.3	(X)
3321-	Gray Iron castings	6 287.7	5 691.2	11.9	7.9	41.3	4.9	(D)	(D)	528.4
33211	Ductile iron pressure pipe and fittings	541.6	535.9	(D)	—	(D)	—	—	—	(D)
33212	Other ductile iron castings	1 113.7	1 092.9	(D)	(D)	3.8	—	—	—	6.1
33216	Gray iron molds and stools for heavy steel ingots	345.8	233.7	—	(D)	—	—	—	—	(D)
33217	Cast iron pressure pipe and fittings	190.5	156.1	—	—	(D)	—	—	—	(D)
33218	Cast iron soil pipe and fittings, gray iron	181.6	178.8	—	—	—	(D)	—	—	(D)
33219	Other gray iron castings	3 707.9	3 293.9	7.1	(D)	37.0	(D)	(D)	(D)	362.0
33210	Gray and ductile iron castings, n.s.k.	206.6	200.0	—	—	—	(D)	—	—	(D)
3322-	Malleable Iron castings	370.8	36.3	286.0	(D)	(D)	—	—	—	33.1
33221	Standard malleable castings	208.0	(D)	(D)	(D)	—	—	—	—	(D)
33222	Pearlitic malleable castings	150.6	(D)	(D)	(D)	—	—	—	—	(D)
33220	Malleable iron castings, n.s.k.	12.2	—	12.2	—	—	—	—	—	—
33240	Steel Investment castings	963.6	(D)	—	921.9	17.4	(D)	.3	—	(D)
3325-	Steel castings, n.e.c.	2 009.7	58.9	(D)	11.5	1 840.4	(D)	6.2	—	(D)
33252	Carbon steel castings, except investment	982.0	29.3	(D)	1.2	893.3	—	—	—	(D)
33254	High alloy steel castings, except investment	496.0	25.3	(D)	(D)	448.5	(D)	(D)	—	(D)
33255	Other alloy steel castings, except investment	465.1	4.3	—	(D)	(D)	—	(D)	—	22.8
33250	Steel castings, n.e.c., n.s.k.	66.5	—	—	(D)	(D)	—	—	—	(D)
3361-	Aluminum castings	2 810.8	17.2	(D)	15.9	7.0	2 591.1	42.2	91.3	(D)
33611	Aluminum and aluminum-base alloy die castings	1 414.5	(D)	—	(D)	(D)	1 314.6	(D)	68.0	30.5
33612	Other aluminum and aluminum-base castings	1 256.4	(D)	(D)	(D)	(D)	1 138.3	(D)	23.3	(D)
33610	Aluminum foundries, n.s.k.	140.0	—	—	—	—	138.2	(D)	—	(D)
33620	Copper and copper-base alloy castings	714.7	13.1	—	6.4	37.1	36.0	606.3	1.1	14.8
3369-	Nonferrous castings, n.e.c.	987.0	2.7	—	(D)	2.2	141.4	3.5	778.0	(D)
33691	Zinc and zinc-base alloy castings	563.1	—	—	—	—	108.6	.8	427.9	25.8
33692	Magnesium and magnesium-base alloy	92.4	(D)	—	—	—	(D)	(D)	(D)	(D)
33693	Other nonferrous castings	259.1	(D)	—	(D)	2.2	(D)	(D)	(D)	(D)
33690	Nonferrous castings, n.e.c., n.s.k.	72.4	—	—	—	—	(D)	—	(D)	(D)
	OTHER SHIPMENTS BY FOUR-DIGIT PRODUCT GROUP									
3079-	Miscellaneous plastics products	(X)	(D)	—	—	—	—	8.1	—	3.1
3312-	Blast furnaces and steel mills	(X)	—	—	—	(D)	(D)	—	—	(D)
3315-	Steel wire and related products	(X)	(D)	—	—	—	(D)	—	—	(D)
3317-	Steel pipe and tubes	(X)	(D)	—	—	(D)	(D)	—	—	(D)
3341-	Secondary nonferrous metals	(X)	(D)	—	—	—	(D)	—	—	(D)
3351-	Copper rolling and drawing	(X)	—	—	—	—	—	(D)	—	(D)
3399-	Primary metal products, n.e.c.	(X)	(D)	—	—	—	(D)	—	—	(D)
3443-	Fabricated plate work (boiler shops)	(X)	(D)	(D)	—	—	(D)	—	—	(D)
3444-	Sheet metal work	(X)	(D)	(D)	—	—	—	—	—	(D)
3449-	Miscellaneous metal work	(X)	—	—	—	(D)	—	—	—	(D)
3462-	Iron and steel forgings	(X)	(D)	(D)	—	(D)	—	—	—	(D)
3469-	Metal stampings, n.e.c.	(X)	(D)	—	—	(D)	(D)	—	—	(D)
3494-	Valves and pipe fittings	(X)	(D)	—	—	(D)	(D)	(D)	—	(D)
3523-	Farm machinery and equipment	(X)	(D)	—	(D)	—	(D)	—	—	(D)
3531-	Construction machinery	(X)	—	—	—	(D)	—	—	—	(D)
3544-	Special dies, tools, jigs, and fixtures	(X)	(D)	—	19.9	2.4	82.2	.8	13.2	(D)
3547-	Rolling mill machinery	(X)	(D)	—	—	(D)	—	—	—	(D)
3549-	Metalworking machinery, n.e.c.	(X)	(D)	—	—	(D)	—	—	—	(D)
3552-	Textile machinery	(X)	(D)	—	—	(D)	(D)	—	—	(D)
3561-	Pumps and pumping equipment	(X)	(D)	—	(D)	—	(D)	—	—	(D)
3565-	Industrial patterns	(X)	36.9	7.8	3.4	23.7	31.7	2.5	4.8	(D)
3592-	Carburetors, pistons, rings, and valves	(X)	—	—	—	(D)	—	—	—	(D)
3599-	Machinery, except electrical, n.e.c.	(X)	5.9	(D)	—	(D)	5.8	(D)	(D)	(D)
3714-	Motor vehicle parts and accessories	(X)	—	—	—	(D)	—	—	(D)	(D)
3743-	Railroad equipment	(X)	—	—	—	(D)	—	—	—	(D)
	MISCELLANEOUS RECEIPTS									
93000 00	Receipts for work done for others on their materials	(X)	4.3	(D)	4.8	16.4	4.0	1.5	1.4	(X)
99980 13	Sales of scrap and refuse	(X)	.7	(D)	.4	19.0	.8	.5	(X)	
99980 61	Receipts for repair work	(X)	2.7	—	(D)	.4	(D)	(D)	(X)	
99980 98	Other miscellaneous receipts, including receipts for repair work, etc.	(X)	15.3	(D)	1.3	10.8	3.5	1.4	(D)	(X)
99980 00	Miscellaneous receipts, including receipts for repair work, sales of scrap and refuse, etc., n.s.k.	(X)	(Z)	.1	—	(D)	1.4	(D)	(Z)	(X)
99989 00	Sales of products bought and resold without further manufacture, processing, or assembly at establishment	(X)	147.8	.4	4.2	27.2	29.5	7.9	8.8	(X)

Table 5c-2. Industry-Product Analysis—Other Industries With Shipments of Primary Products: 1982

[Million dollars. Table is a continuation of table 5c-1 and shows where products of industries in this chapter (referred to as primary products and listed in table 6a) are made. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column of table 5c-1. Specified "Other industries" are listed in this table if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Other industries	Value	1982 product code	Other industries	Value
3321-	GRAY IRON CASTINGS		3324-	STEEL INVESTMENT CASTINGS	
	2531 Public building and related furniture	(D)	3711 Motor vehicles and car bodies	(D)	
	3312 Blast furnaces and steel mills	127.6	3325-	STEEL CASTINGS, N.E.C.	
	3341 Secondary nonferrous metals	(D)	3312 Blast furnaces and steel mills	(D)	
	3441 Fabricated structural metal	31.9	3462 Iron and steel forgings	(D)	
	3494 Valves and pipe fittings	(D)	3547 Rolling mill machinery	(D)	
	3523 Farm machinery and equipment	(D)	3566 Speed changers, drives, and gears	(D)	
	3533 Oil field machinery	10.6	3361-	ALUMINUM CASTINGS	
	3541 Machine tools, metal cutting types	(D)	3079 Miscellaneous plastics products	5.5	
	3542 Machine tools, metal forming types	7.8	3679 Electronic components, n.e.c.	(D)	
	3561 Pumps and pumping equipment	21.6	3362-	BRASS, BRONZE, AND COPPER CASTINGS	
	3592 Carburetors, pistons, rings, valves	(D)	3494 Valves and pipe fittings	(D)	
	3714 Motor vehicle parts and accessories	(D)	3369-	NONFERROUS CASTINGS, N.E.C.	
	3795 Tanks and tank components	(D)	3079 Miscellaneous plastics products	16.5	
3322-	MALLEABLE IRON CASTINGS		3356 Nonferrous rolling and drawing, n.e.c.	13.2	
	3519 Internal combustion engines, n.e.c.	(D)	3623 Welding apparatus, electric	(D)	
	3644 Noncurrent-carrying wiring devices	(D)			

Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments ¹	Value (million dollars)	Number of companies with shipments of \$100,000 or more	Product shipments ¹	Value (million dollars)
GRAY AND DUCTILE IRON FOUNDRIES							
3321--	Total ----- 1,000 s tons--	(NA)	(X)	6 287.7	(NA)	313 090.7	7 835.2
33211 --	Ductile iron pressure pipe and fittings ----- do--	(NA)	(X)	541.6	(NA)	1 189.5	497.6
33211 22	Ductile iron pressure pipe:						
33211 24	3 in. up to and including 10 in. (inside diameter) ----- do--	6	*423.9	184.1	9	526.4	193.7
33211 27	12 in. up to and including 20 in. (inside diameter) ----- do--	6	435.3	197.1	8	435.4	156.2
33211 30	24 in. up to and including 54 in. (inside diameter) ----- do--	5		91.8	5	168.1	68.9
	Other ----- do--	4			1		
33211 33	Fittings:						
33211 36	3 in. up to and including 10 in. (inside diameter) ----- do--	9	5.1	9.3	11	26.0	33.2
33211 39	12 in. up to and including 20 in. (inside diameter) ----- do--	8	4.8	9.2	8		
33211 42	24 in. up to and including 54 in. (inside diameter) ----- do--	4	(*)	(*)	4	33.6	45.6
33211 00	Other ----- do--	5	432.2	445.8	3		
	Ductile iron pressure pipe and fittings, n.s.k. ----- do--	(NA)	(X)	4.4	(NA)	(X)	-
33212 --	Other ductile iron castings ----- 1,000 s tons--	(NA)	(X)	1 113.7	(NA)	31 397.3	1 125.6
33212 22	Automotive uses ----- do--	40	632.9	627.0	43	996.8	660.5
33212 24	Construction and utility uses ----- do--	37	*26.5	39.1	28	35.1	48.6
33212 31	Valve uses ----- do--	32	*20.7	38.7			
33212 32	Electric and electronic equipment uses ----- do--	10	5.7	10.2			
33212 33	Machinery uses ----- do--	68	**84.3	122.8			
33212 34	Heat resistant parts, including coke oven door parts ----- do--	7	(S)	13.3			
33212 39	All other uses ----- do--	113	**183.2	252.6			
33212 00	Other ductile iron castings, n.s.k. ----- do--	(NA)	(X)	9.9	(NA)	5.7	4.6
33216 00	Molds and stools for heavy steel ingots:						
	Molds and stools for heavy steel ingots ----- do--	(NA)	923.6	345.8	16	2 049.4	551.4
33217 --	Cast iron pressure pipe and fittings ----- do--	(NA)	(X)	190.5	(NA)	343.5	177.7
33217 32	Cast iron pressure pipe:						
33217 34	3 in. up to and including 10 in. (inside diameter) ----- do--	6	(S)	10.6	15	*121.6	36.0
33217 37	12 in. up to and including 20 in. (inside diameter) ----- do--	5	(S)	11.5	12		
33217 40	24 in. up to and including 54 in. (inside diameter) ----- do--	2	(S)	(*)	2	99.0	42.5
	Other ----- do--	4	(S)	627.5	5		

See footnotes at end of table.

Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments ¹	Value (million dollars)	Number of companies with shipments of \$100,000 or more	Product shipments ¹	Value (million dollars)
GRAY AND DUCTILE IRON FOUNDRIES—Con.							
33217 —	Cast iron pressure pipe and fittings —Con.						
	Fittings:						
33217 43	3 in. up to and including 10 in. (inside diameter) -----	1,000 s tons	18	*53.0	58.8	15	*73.9
33217 46	12 in. up to and including 20 in. (inside diameter) -----	do	12	22.7	25.1	16	*32.0
33217 49	24 in. up to and including 54 in. (inside diameter) -----	do	11	5.8	7.7	7	27.7
33217 52	Other -----	do	12	*55.5	43.8	5	15.8
33217 00	Cast iron pressure pipe and fittings, n.s.k. -----	do	(NA)	(X)	5.5	(NA)	1.3
33218 —	Cast iron soil pipe and fittings, including special fittings -----	do	(NA)	(X)	181.6	(NA)	493.4
	Cast iron soil pipe:						
33218 22	Up to 3 in. (inside diameter) -----	do	8	*109.5	50.3	7	95.2
33218 24	3 in. up to, but not including 5 in. (inside diameter) -----	do	9	*79.0	30.8	8	167.0
33218 27	5 in. or more (inside diameter) -----	do	7	101.6	35.9	9	25.1
	Fittings, including special fittings:						
33218 30	Up to 3 in. (inside diameter) -----	do	9	40.3	31.1	11	56.6
33218 33	3 in. up to, but not including 5 in. (inside diameter) -----	do	10	24.8	17.8	13	31.8
33218 36	5 in. or more (inside diameter) -----	do	9	*15.7	13.2	13	32.2
33218 00	Cast iron soil pipe and fittings, including special fittings, n.s.k. -----		(NA)	(X)	2.4	-	-
33219 —	Other gray iron castings -----	1,000 s tons	(NA)	(X)	3 707.9	(NA)	*7 279.8
33219 31	Rolls for rolling mills -----	do	17	(S)	153.2	12	(S)
33219 39	Automotive uses -----	do	69	1 770.7	1 497.3	90	3 968.0
33219 49	Construction and utility uses -----	do	95	(S)	464.4	106	(S)
33219 98	All other uses -----	do	410	(S)	1 564.8	485	*2 477.3
33219 00	Other gray iron castings, n.s.k. -----	do	(NA)	(X)	28.4	(NA)	*30.2
33210 00	Gray and ductile iron foundries, n.s.k., typically for establishments with 20 employees or more (see note) -----		(NA)	(X)	160.5	(NA)	*212.8
33210 02	Gray and ductile iron foundries, n.s.k., typically for establishments with less than 20 employees (see note) -----		(NA)	(X)	46.1	(NA)	*125.0
MALLEABLE IRON FOUNDRIES							
3322 —	Total -----		(NA)	(X)	7370.8	(NA)	(X)
33221 —	Standard malleable castings:						
33221 00	Standard malleable iron castings -----	1,000 s tons	38	115.5	208.0	53	528.3
33222 —	Pearlitic malleable castings:						
33222 00	Pearlitic malleable iron castings -----	do	16	99.7	150.6	25	237.3
33220 00	Malleable iron foundries, n.s.k., typically for establishments with 20 employees or more (see note) -----	do	(NA)	(X)	9.5	(NA)	(X)
33220 02	Malleable iron foundries, n.s.k., typically for establishments with less than 20 employees (see note) -----		(NA)	(X)	2.7	(NA)	(NA)
STEEL INVESTMENT FOUNDRIES							
3324 —	Total -----		(NA)	(X)	963.6	(NA)	(X)
33240 —	Steel investment castings:						
33240 63	Carbon, including low alloy -----	1,000 lb	48	(S)	139.5	36	(S)
33240 64	Alloy, including stainless -----	do	46	(S)	233.2		79.0
33240 66	Stainless steel -----	do	59	(S)	198.4		
33240 67	Hi-temp metal fastings (iron, nickel, or cobalt-base alloys) -----	do	31	22 971.7	354.2		
33240 00	Steel investment foundries, n.s.k., typically for establishments with 10 employees or more (see note) -----	do	(NA)	(X)	34.5	(NA)	*1 954.9
33240 02	Steel investment foundries, n.s.k., typically for establishments with less than 10 employees (see note) -----	do	(NA)	(X)	3.9	(NA)	536.4
STEEL FOUNDRIES, N.E.C.							
3325 —	Total -----		(NA)	(X)	2 009.7	(NA)	*1 602.1
33252 —	Carbon steel castings, except investment -----		(NA)	(X)	982.0	(NA)	*1 120.2
33252 12	Cast steel railroad car wheels -----	1,000 s tons	2	275.9	199.4	3	606.5
33252 13	Railway specialties, except cast railroad car wheels -----	do	12			11	446.7
33252 15	Rolls for rolling mills -----	do	9	(S)	21.2	7	26.2
33252 19	Other carbon steel castings -----	do	126	*292.6	753.2	129	*481.8
33252 00	Carbon steel castings, except investment, n.s.k. -----	do	(NA)	(X)	8.3	(NA)	5.8
33254 —	High alloy steel castings, except investment -----	do	(NA)	(X)	496.0	(NA)	*1 108.6
33254 21	High manganese steel castings -----	do	14	**44.8	95.3	13	84.1
33254 31	Other high alloy steel castings -----	do	100	**57.8	393.9	101	*56.7
33254 00	High alloy steel castings, except investment, n.s.k. -----	do	(NA)	(X)	6.9	(NA)	*1.4
33255 —	Other alloy steel castings, except investments -----	do	(NA)	(X)	465.1	(NA)	*324.7
33255 51	Railway specialties -----	do	4	13.1	22.0	9	54.2
33255 55	Rolls for rolling mills -----	do	8	**28.4	51.2	8	51.1
33255 59	All other alloy steel castings -----	do	80	(S)	382.5	76	*255.1
33255 00	Other alloy steel castings, except investments, n.s.k. -----	do	(NA)	(X)	9.5	(NA)	*2.8
33250 00	Steel foundries, n.e.c., n.s.k., typically for establishments with 20 employees or more (see note) -----	do	(NA)	(X)	45.1	(NA)	*27.9
33250 02	Steel foundries, n.e.c., n.s.k., typically for establishments with less than 20 employees (see note) -----	do	(NA)	(X)	21.4	(NA)	*20.7

See footnotes at end of table.

Table 6a. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments ¹		Number of companies with shipments of \$100,000 or more	Product shipments ¹	
			Quantity ²	Value (million dollars)		Quantity ²	Value (million dollars)
ALUMINUM FOUNDRIES							
3361—	Total	(NA)	(X)	72 810.8	(NA)	(X)	2 294.2
33611—	Aluminum and aluminum-base alloy die castings:						
33611 00	Aluminum and aluminum-base alloy die castings (except cast aluminum cooking utensils) mil lb.	271	**1 224.2	1 414.5	234	1 000.5	1 086.8
33612—	Other aluminum and aluminum-base castings (including cast finished products)	(NA)	(X)	1 256.4	(NA)	(X)	1 055.0
33612 11	Sand mil lb.	383	196.1	569.8	358	*186.9	377.0
33612 31	Permanent and semipermanent mold do.	115	*259.2	434.0	145	351.0	508.8
33612 51	Investment do.	37	(S)	73.7	24	(S)	30.6
33612 61	Other do.	35	(S)	105.1	43	*38.3	74.8
33612 73	Nonelectric cast aluminum pressure cookers, household type and nonelectric cast aluminum cooking utensils	5	(X)	29.0	9	(X)	44.6
33612 00	Aluminum and aluminum-base alloy castings, n.s.k.	25	(X)	44.8	16	(X)	19.1
33610 00	Aluminum foundries, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	83.2	(NA)	(X)	94.3
33610 02	Aluminum foundries, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	56.8	(NA)	(X)	58.2
BRASS, BRONZE, AND COPPER FOUNDRIES							
3362—	Total	(NA)	(X)	7714.7	(NA)	(X)	615.6
33620—	Copper and copper-base alloy castings:						
33620 20	Sand castings:						
33620 20	Alloy C84400 mil lb.	58	*38.4	82.3	(NA)		
33620 21	Other leaded red and semired brasses do.	113	(S)	80.0	(NA)		
33620 22	Tin bronzes, including leaded and high leaded do.	59	*46.8	55.0	(NA)		
33620 23	Other alloys, including yellow and leaded yellow brasses, nickel tin bronzes, nickel silvers, lead bronzes, and special alloys	49	**104.5	72.3	(NA)	*218.9	365.5
33620 24	Copper and high copper alloys mil lb.	42	20.8	72.3	(NA)		
33620 25	Engineered alloys, including manganese bronzes, silicon bronzes and brasses, aluminum bronzes, and copper nickels do.	101	*65.8	102.5	(NA)		
33620 31	Permanent and semipermanent mold do.	11	(S)	33.2	17	*20.8	32.0
33620 42	Die, including bearing and bushings do.	10	(S)	12.8	23	23.6	47.9
33620 51	Investment 1,000 lb.	17	(S)	9.8	19	(S)	12.8
33620 61	Other mil lb.	24	**50.6	52.1	45	*37.7	62.7
33620 72	Copper-base alloy bearings and bushings, nonmachined, except die cast	13	190.9	13.7	31	(X)	27.5
33620 00	Copper and copper-base alloy castings, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	108.6	(NA)	(X)	48.2
33620 02	Copper and copper-base alloy castings, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	19.9	(NA)	(X)	19.1
NONFERROUS FOUNDRIES, N.E.C.							
3369—	Total	(NA)	(X)	7987.0	(NA)	(X)	878.1
33691—	Zinc and zinc-base alloy castings	(NA)	(X)	563.1	(NA)	(X)	609.9
33691 51	Die mil lb.	194	*303.5	534.2	196	*446.6	586.3
33691 61	Other do.	13	(S)	15.1	17	21.5	22.9
33691 00	Zinc and zinc-base alloy castings, n.s.k.	(NA)	(X)	13.9	(NA)	(X)	.7
33692—	Magnesium and magnesium-base alloy	(NA)	(X)	92.4	(NA)	(X)	83.3
33692 11	Sand mil lb.	22	(S)	67.4	25	(S)	32.2
33692 31	Die do.	10	5.5	17.1	12	(S)	31.8
33692 33	Cast anodes do.	3			6	**9.6	15.2
33692 41	Other, including permanent and semipermanent molds do.	1	(X)	8.0	4	10.8	3.5
33692 00	Magnesium and magnesium-base alloy, n.s.k.	(NA)			(NA)	(X)	.6
33693—	Other nonferrous castings	(NA)	(X)	259.1	(NA)	(X)	138.8
33693 71	Lead and lead-base alloy die mil lb.	14	(S)	19.0	12	*38.3	24.6
33693 91	Other nonferrous metal die castings do.	17	*11.7	67.5	35	(S)	112.5
33693 99	Other nonferrous metal castings, excluding die castings do.	37	(S)	168.9	(NA)	(X)	1.7
33693 00	Other nonferrous castings, n.s.k.	(NA)	(X)	3.7	(NA)	(X)	
33690 00	Nonferrous foundries, n.e.c., n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	(X)	48.9	(NA)	(X)	25.2
33690 02	Nonferrous foundries, n.e.c., n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	(X)	23.5	(NA)	(X)	20.9

Note: In 1982 Census of Manufactures, data for establishments of small single-unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoff used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1982 and 1977 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

¹Data reported by all producers, not just those with shipments of \$100,000 or more.

²For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

³Includes estimated n.s.k. data.

⁴For 1982, product code 33211 39 is included with product code 33211 42 to avoid disclosing data for individual companies.

⁵Data estimated.

⁶For 1982, product code 33217 37 is included with product code 33217 40 to avoid disclosing data for individual companies.

⁷Additional tonnage data are published in the Current Industrial Report M33A, Iron and Steel Castings. Data differ from census data because CIR production data "for own use" include interplant transfers and castings produced and consumed by plants with captive foundries.

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1982 and 1977

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1982. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Product class and geographic area	1982 value of product shipments	1977 value of product shipments	Product class and geographic area	1982 value of product shipments	1977 value of product shipments
33211, DUCTILE IRON PRESSURE PIPE AND FITTINGS			33252, CARBON STEEL CASTINGS, EXCEPT INVESTMENT		
United States -----	541.6	497.6	United States -----	982.0	1 250.9
New Jersey -----	80.2	76.2	Alabama -----	81.2	71.8
Ohio -----	52.1	(NA)	California -----	70.5	47.8
33212, OTHER DUCTILE IRON CASTINGS			Georgia -----	5.7	(BB)
United States -----	1 113.7	1 125.6	Illinois -----	53.9	160.9
Alabama -----	34.9	16.7	Indiana -----	44.8	74.9
California -----	29.0	23.9	Iowa -----	60.4	44.0
Illinois -----	97.1	110.2	Louisiana -----	40.1	(FF)
Indiana -----	35.1	29.5	Michigan -----	31.5	41.7
Kansas -----	7.0	8.5	Missouri -----	14.3	(FF)
Michigan -----	232.4	322.8	New Hampshire -----	2.6	(BB)
Minnesota -----	19.2	20.2	New York -----	27.8	59.1
New York -----	10.5	(NA)	Ohio -----	133.6	177.3
North Carolina -----	8.3	5.8	Pennsylvania -----	122.9	183.3
Ohio -----	260.4	239.2	Texas -----	41.0	57.9
Oklahoma -----	29.8	16.1	Washington -----	45.6	26.6
Pennsylvania -----	39.5	17.6	Wisconsin -----	68.1	115.3
Tennessee -----	33.6	69.6			
Texas -----	18.8	16.5			
Washington -----	4.6	5.1			
Wisconsin -----	112.7	77.9			
33216, GRAY IRON MOLDS AND STOOLS FOR HEAVY STEEL INGOTS			33254, HIGH ALLOY STEEL CASTINGS, EXCEPT INVESTMENT		
United States -----	345.8	551.4	United States -----	496.0	367.0
Pennsylvania -----	147.6	260.5	Alabama -----	13.1	8.8
33217, CAST IRON PRESSURE PIPE AND FITTINGS			California -----	36.9	24.1
United States -----	190.5	177.7	Illinois -----	8.9	32.6
Alabama -----	56.1	57.4	Indiana -----	11.5	5.1
Illinois -----	2.0	(AA)	Michigan -----	7.8	17.1
Michigan -----	2.2	(NA)	Missouri -----	25.1	(FF)
Ohio -----	10.5	(CC)	New Jersey -----	20.5	(CC)
Pennsylvania -----	8.3	13.2	Ohio -----	55.1	43.3
33218, CAST IRON SOIL PIPE AND FITTINGS, GRAY IRON			Pennsylvania -----	64.4	61.9
United States -----	181.6	200.3	Texas -----	12.8	9.4
California -----	21.3	20.8	Washington -----	28.9	19.1
33219, OTHER GRAY IRON CASTINGS			Wisconsin -----	65.3	26.0
United States -----	3 707.9	5 081.9	33255, OTHER ALLOY STEEL CASTINGS, EXCEPT INVESTMENT		
Alabama -----	28.9	39.3	United States -----	465.1	521.0
Arkansas -----	16.8	11.9	Alabama -----	15.4	(EE)
California -----	67.8	85.8	California -----	17.7	28.9
Colorado -----	5.1	10.3	Connecticut -----	2.6	(CC)
Connecticut -----	27.4	25.5	Illinois -----	10.8	10.6
Georgia -----	18.2	19.3	Michigan -----	6.7	13.1
Illinois -----	371.7	500.7	Mississippi -----	2.8	(NA)
Indiana -----	303.6	386.1	New Hampshire -----	41.2	(GG)
Iowa -----	124.5	93.9	New York -----	61.0	35.3
Kansas -----	19.4	29.5	Ohio -----	86.7	121.9
Maryland -----	12.1	12.6	Pennsylvania -----	50.9	32.9
Massachusetts -----	49.3	42.7	Texas -----	36.6	64.3
Michigan -----	634.9	1 371.1	Wisconsin -----		
Minnesota -----	36.7	39.4	33611, ALUMINUM AND ALUMINUM-BASE ALLOY DIE CASTINGS		
Missouri -----	75.7	70.9	United States -----	1 414.5	1 086.8
Nebraska -----	6.2	8.7	Arkansas -----	16.3	9.5
New Jersey -----	23.3	27.2	California -----	118.8	73.0
New York -----	159.6	227.8	Connecticut -----	15.2	22.3
North Carolina -----	15.4	13.2	Illinois -----	141.0	123.7
Ohio -----	757.5	967.0	Iowa -----	12.7	12.2
Oklahoma -----	16.1	26.7	Massachusetts -----	15.8	10.2
Oregon -----	12.0	9.6	Michigan -----	168.9	96.0
Pennsylvania -----	257.0	235.7	Minnesota -----	37.3	27.6
Rhode Island -----	4.4	(AA)	Missouri -----	17.6	15.2
South Carolina -----	13.2	7.8	New Jersey -----	19.7	11.2
Tennessee -----	110.4	135.1			
Texas -----	75.7	67.0			
Virginia -----	56.3	(GG)			
Washington -----	9.4	6.6			
West Virginia -----	32.9	17.4			
Wisconsin -----	298.9	358.1			
33221, STANDARD MALLEABLE CASTINGS					
United States -----	208.0	453.0	New York -----	88.2	55.9
Illinois -----	10.4	14.9	Ohio -----	192.0	171.0
Ohio -----	35.4	58.3	Pennsylvania -----	72.5	64.9
Pennsylvania -----	25.5	67.1	South Carolina -----	14.4	14.6
Wisconsin -----	20.2	46.0	Tennessee -----	20.3	9.9

See footnotes at end of table.

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1982 and 1977—Con.

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1982. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Product class and geographic area	1982 value of product shipments	1977 value of product shipments	Product class and geographic area	1982 value of product shipments	1977 value of product shipments
33612, OTHER ALUMINUM AND ALUMINUM-BASE CASTINGS			33691, ZINC AND ZINC-BASE ALLOY CASTINGS		
United States -----	1 256.4	1 055.0	United States -----	563.1	609.9
Alabama -----	33.5	(GG)	California -----	41.5	37.9
Arizona -----	3.3	3.0	Connecticut -----	12.4	15.0
California -----	185.2	114.0	Illinois -----	72.7	71.3
Colorado -----	10.8	8.9	Michigan -----	169.0	170.0
Connecticut -----	8.3	8.7	Minnesota -----	11.9	8.3
Florida -----	8.2	4.1	Missouri -----	19.7	16.4
Georgia -----	2.6	.9	New Jersey -----	15.9	9.3
Illinois -----	31.0	32.9	New York -----	58.6	53.9
Indiana -----	75.2	70.1	Ohio -----	55.4	95.1
Iowa -----	31.1	9.5	Pennsylvania -----	22.8	22.1
Kansas -----	4.0	5.6	Tennessee -----	5.5	7.2
Massachusetts -----	17.4	11.3	Texas -----	3.0	1.4
Michigan -----	73.3	103.6	Wisconsin -----	18.2	15.1
Minnesota -----	54.0	39.9			
Missouri -----	49.5	32.4			
New Hampshire -----	23.5	6.8	33692, MAGNESIUM AND MAGNESIUM-BASE ALLOY		
New Jersey -----	17.6	6.5	United States -----	92.4	83.3
New York -----	72.1	105.4	California -----	7.5	6.5
North Carolina -----	14.4	6.7	Illinois -----	11.5	6.6
Ohio -----	213.3	200.6	Ohio -----	5.9	5.4
Oklahoma -----	13.3	8.2	33693, OTHER NONFERROUS CASTINGS		
Pennsylvania -----	67.3	38.9	United States -----	259.1	138.8
Rhode Island -----	2.8	1.3	Alabama -----	4.5	(AA)
Texas -----	37.3	26.9	California -----	29.9	22.5
Utah -----	2.7	(AA)	Illinois -----	4.4	(BB)
Washington -----	10.5	11.6	New York -----	16.1	(BB)
Wisconsin -----	94.0	78.7	Pennsylvania -----	2.4	1.0
			Wisconsin -----	3.9	(AA)

Note: For 1977, the following value ranges (in million dollars) substitute for actual figures withheld to avoid disclosing data for individual companies: AA—less than \$2.0 but not 0; BB—\$2.0 to \$4.9; CC—\$5.0 to \$9.9; EE—\$10.0 to \$19.9; FF—\$20.0 to \$49.9; GG—\$50.0 or more.

Table 6c. Product Classes—Value Shipped by All Producers: 1982 and Earlier Years

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Product class	1982	1981 ¹	1980 ¹	1979 ¹	1978 ¹	1977	1972	1967
3321-	Gray Iron castings	6 287.7	8 572.9	7 839.2	9 150.4	8 843.6	7 835.2	4 033.8	2 740.4
33211	Ductile iron pressure pipe and fittings	541.6	583.4	543.5	572.1	587.2	497.6	605.4	(NA)
33212	Other ductile iron castings	1 113.7	1 232.2	1 153.7	1 394.5	1 285.6	1 125.6		(NA)
33216	Gray iron molds and stools for heavy steel ingots	345.8	996.2	579.1	761.2	660.4	551.4	312.0	(NA)
33217	Cast iron pressure pipe and fittings	190.5	172.4	180.8	184.2	181.4	177.7	245.4	(NA)
33218	Cast iron soil pipe and fittings, gray iron	181.6	225.6	187.9	227.1	200.0	200.3	220.2	156.0
33219	Other gray iron castings	3 707.9	5 157.0	4 985.4	5 825.1	5 704.2	5 081.9	2 546.2	(NA)
33210	Gray and ductile iron castings, n.s.k.	206.6	206.1	208.8	186.2	(S)	200.8	104.6	117.5
3322-	Malleable Iron castings	370.8	507.7	494.2	707.9	679.9	669.5	484.8	417.2
33221	Standard malleable castings	208.0	305.8	316.1	461.3	450.6	453.0	345.8	(NA)
33222	Pearlitic malleable castings	150.6	185.5	165.7	237.0	218.3	208.7	129.3	(NA)
33220	Malleable iron castings, n.s.k.	12.2	16.4	12.4	9.7	(S)	7.8	9.7	(NA)
33240	Steel Investment castings	963.6	951.0	899.4	748.0	512.4	434.1	237.7	167.6
3325-	Steel castings, n.e.c.	2 009.7	3 002.2	3 147.1	3 005.7	2 534.9	2 205.8	1 050.3	1 042.1
33252	Carbon steel castings, except investment	982.0	1 621.8	1 815.6	1 744.9	1 445.9	1 250.9	543.7	619.0
33254	High alloy steel castings, except investment	496.0	702.0	671.9	611.0	486.7	367.0	127.7	(NA)
33255	Other alloy steel castings, except investment	465.1	608.7	607.3	615.8	497.5	521.0	346.5	(NA)
33250	Steel castings, n.e.c., n.s.k.	66.5	69.8	52.3	34.0	(S)	66.9	32.4	33.1
3361-	Aluminum castings	2 810.8	3 325.9	3 134.6	3 159.9	2 613.5	2 294.2	1 172.3	885.4
33611	Aluminum and aluminum-base alloy die castings	1 414.5	1 764.4	1 650.0	1 653.2	1 302.1	1 086.8	532.6	(NA)
33612	Other aluminum and aluminum-base castings	1 256.4	1 389.9	1 266.9	1 349.5	1 143.5	1 055.0	509.7	(NA)
33610	Aluminum foundries, n.s.k.	140.0	171.6	217.7	157.2	(S)	152.5	130.0	(NA)
33620	Copper and copper-base alloy castings	714.7	888.1	879.0	862.0	689.9	615.6	462.9	432.3
3369-	Nonferrous castings, n.e.c.	987.0	1 004.3	982.9	1 035.1	938.5	878.1	603.5	551.3
33691	Zinc and zinc-base alloy castings	563.1	571.5	556.4	657.9	605.8	609.9	401.6	323.3
33692	Magnesium and magnesium-base alloy	92.4	117.6	138.8	125.3	(S)	83.3	41.3	
33693	Other nonferrous castings	259.1	247.5	243.5	213.5	163.2	138.8	94.7	178.5
33690	Nonferrous castings, n.e.c., n.s.k.	72.4	67.8	44.1	38.4	(S)	46.1	65.9	49.5

¹Figures are estimates derived from a representative sample of manufacturing establishments canvassed in annual survey of manufactures and, therefore, may differ from results that would be obtained from a complete canvass of all manufacturing establishments. Standard errors associated with estimates are published in annual survey of manufactures volumes for this period.

Table 7. Materials Consumed by Kind: 1982 and 1977

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
INDUSTRY 3321, GRAY IRON FOUNDRIES					
	Materials, parts, containers, and supplies -----	(X)	2 082.8	(X)	2 671.6
331051	Pig iron, excluding silvery iron ----- 1,000 s tons--	662.8	148.9	1 957.3	343.3
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed ----- do-----	.4	.6	*1.1	1.2
333405	Aluminum-base alloys ----- do-----	2.9	4.2	3.6	3.9
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.) ----- do-----	*1.1	1.7	(S)	1.5
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.) ----- do-----	*5.4	9.2	(S)	6.3
333348	Zinc and zinc-base alloys ----- do-----			(S)	
333971	Nickel-base alloys ----- do-----			(X)	(*)
333982	Cobalt-base alloys ----- do-----				
333973	Magnesium and magnesium-base alloys ----- (S)-----		21.1	33.5	33.4
331313	Ferromanganese, siliconmanganese, and manganese ----- 1,000 s tons--	*42.1	15.5	97.2	41.7
331320	Ferrochromium ----- do-----	*8.1	5.4	10.1	6.3
331331	Ferrosilicon (more than 8 percent silicon) ----- do-----	140.6	66.4	176.6	67.0
331309	Other ferroalloys, including silvery iron ----- do-----	**110.1	48.3	264.1	80.4
190023	Iron and steel purchased scrap (excluding home scrap) ----- do-----	5 292.7	432.6	9 252.9	688.2
144603	Sand ----- do-----	(S)	81.3	5 554.3	86.9
325501	Clay refractories ----- do-----	(S)	23.4	(S)	30.9
329701	Nonclay refractories ----- do-----	(S)	19.0	*55.2	15.0
354402	Industrial dies, molds, jigs, and fixtures ----- do-----	(X)	10.2	(X)	(*)
329101	Grinding wheels and other abrasive products (except industrial diamonds) ----- (X)-----				
362002	Electrodes ----- (X)-----		17.6	(X)	(*)
289953	Pattern wax ----- (X)-----		12.1	(X)	(*)
356501	Industrial patterns ----- (X)-----		(*)	(X)	(*)
970099	All other materials and components, parts, containers, and supplies, excluding coal and coke ----- (X)-----		25.6	(X)	(*)
971000	Materials, parts, containers, and supplies, n.s.k. ² ----- (X)-----	(X)	3901.7	(X)	41 082.4
			224.9	(X)	183.2
INDUSTRY 3322, MALLEABLE IRON FOUNDRIES					
	Materials, parts, containers, and supplies -----	(X)	66.2	(X)	197.5
331051	Pig iron, excluding silvery iron ----- 1,000 s tons--	15.2	3.0	(S)	6.2
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed ----- do-----			(D)	(D)
333405	Aluminum-base alloys ----- do-----			(X)	.7
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.) ----- do-----			(D)	(D)
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.) ----- do-----	.8	1.6		
333348	Zinc and zinc-base alloys ----- do-----			.3	.4
333973	Magnesium and magnesium-base alloys ----- do-----	-	-	(D)	(D)
333971	Nickel-base alloys ----- do-----	.1	.3	(X)	(*)
333982	Cobalt-base alloys ----- do-----	-	-	(X)	(*)
331313	Ferromanganese, siliconmanganese, and manganese ----- do-----			2.8	1.6
331320	Ferrochromium ----- do-----	6.5	2.8		
331331	Ferrosilicon (more than 8 percent silicon) ----- do-----			2.2	.2
331309	Other ferroalloys, including silvery iron ----- do-----	2.2	1.3	16.3	7.5
190023	Iron and steel purchased scrap (excluding home scrap) ----- do-----	204.2	16.8	808.5	61.3
144603	Sand ----- do-----	*109.3	2.2	412.5	5.1
325501	Clay refractories ----- do-----			(S)	3.3
329701	Nonclay refractories ----- do-----			(X)	2.5
354402	Industrial dies, molds, jigs, and fixtures ----- do-----			(*)	(*)
329101	Grinding wheels and other abrasive products (except industrial diamonds) ----- (X)-----				
365501	Industrial patterns ----- (X)-----		1.1	(X)	(*)
362002	Electrodes ----- (X)-----		.1	(X)	(*)
289953	Pattern wax ----- (X)-----		(*)	(X)	(*)
970099	All other materials and components, parts, containers, and supplies, excluding coal and coke ----- (X)-----		25.2	(X)	595.5
971000	Materials, parts, containers, and supplies, n.s.k. ² ----- (X)-----	(X)	8.7	(X)	8.2
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES					
	Materials, parts, containers, and supplies -----	(X)	282.4	(X)	118.3
331051	Pig iron, excluding silvery iron ----- 1,000 s tons--	(S)	1.6	(S)	2.3
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed ----- do-----	(Z)	(?)	(D)	(D)
333405	Aluminum-base alloys ----- do-----	(S)	(?)	(S)	(D)
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.) ----- do-----	(Z)	(Z)	(D)	(D)
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.) ----- do-----				
333973	Magnesium and magnesium-base alloy ----- do-----	.6	1.1	*1.1	1.3
333971	Nickel-base alloy ----- do-----	(S)	(?)	(D)	(D)
333982	Cobalt-base alloy ----- do-----	7.3	49.3	(X)	(*)
331313	Ferromanganese, siliconmanganese, and manganese ----- 1,000 s tons--	4.7	27.9	(X)	(*)
331320	Ferrochromium ----- do-----	(S)	.4	(S)	1.2
331331	Ferrosilicon (more than 8 percent silicon) ----- do-----	2.9	2.5	(X)	3.5
331309	Other ferroalloys, including silvery iron ----- do-----	1.1	.4	(D)	(D)
190023	Iron and steel purchased scrap (excluding home scrap) ----- do-----	11.7	16.5	(S)	32.8
144603	Sand ----- do-----	74.3	7.6	(S)	6.2
325501	Clay refractories ----- do-----	*70.1	10.1	6.5	.9
329701	Nonclay refractories ----- do-----	*23.0	2.3	(S)	.7
354402	Industrial dies, molds, jigs, and fixtures ----- do-----	(S)	6.9	*5.4	2.4
329101	Grinding wheels and other abrasive products (except industrial diamonds) ----- (X)-----	(X)	9.4	(X)	(*)
365501	Industrial patterns ----- (X)-----	(X)	8.3	(X)	(*)
		(X)	2.2	(X)	(*)

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
INDUSTRY 3324, STEEL INVESTMENT FOUNDRIES—Con.					
362002	Electrodes	(X)	1.2	(X)	(9)
289953	Pattern wax	(X)	7.9	(X)	(9)
970099	All other materials and components, parts, containers, and supplies, excluding coal and coke	(X)	784.1	(X)	949.3
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	42.7	(X)	17.5
INDUSTRY 3325, STEEL FOUNDRIES, N.E.C.					
	Materials, parts, containers, and supplies	(X)	607.7	(X)	714.3
331051	Pig iron, excluding silvery iron	1,000 s tons	(S)	10.7	(S)
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed	do	*1.1	1.3	1.9
333405	Aluminum-base alloys	do	(S)	1.0	.8
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.)	do	**2.5	2.9	1.3
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.)	do	*2.0	3.2	10.3
333973	Magnesium and magnesium-base alloys	do	(D)	(10)	.2
333971	Nickel-base alloy	do	(S)	21.6	(X)
333982	Cobalt-base alloy	1,000 lb	*461.5	2.4	(9)
331313	Ferromanganese, siliconmanganese, and manganese	1,000 s tons	*17.1	8.9	*43.1
331320	Ferrochromium	do	**12.6	11.9	**23.0
331331	Ferrosilicon (more than 8 percent silicon)	do	**7.7	4.8	**21.7
331309	Other ferroalloys, including silvery iron	do	(S)	14.2	*32.6
190023	Iron and steel purchased scrap (excluding home scrap)	do	*995.7	93.7	1 844.1
144603	Sand	do	(S)	28.0	*1 249.3
325501	Clay refractories	do	(S)	6.2	(S)
329701	Nonclay refractories	do	(S)	9.8	(S)
354402	Industrial dies, molds, jigs, and fixtures		(X)	6.1	(X)
329101	Grinding wheels and other abrasive products (except industrial diamonds)		(X)	12.7	(X)
356501	Industrial patterns		(X)	7.6	(X)
362002	Electrodes		(X)	24.0	(X)
289953	Pattern wax		(X)	(10)	(NA)
970099	All other materials and components, parts, containers, and supplies, excluding coal and coke	(X)	10232.9	(X)	949.6
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	103.8	(X)	55.2
INDUSTRY 3361, ALUMINUM FOUNDRIES					
	Materials, parts, containers, and supplies	(X)	1 102.2	(X)	1 052.8
331051	Pig iron, excluding silvery iron	1,000 s tons	2.3	1.4	59.4
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed	do	**59.7	67.1	108.7
333405	Aluminum-base alloys	do	(S)	503.2	538.1
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.)	do	**2.0	1.7	1.4
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.)	do	(S)	20.9	8.5
333348	Zinc and zinc-base alloys	do	*32.1	22.0	63.3
333973	Magnesium and magnesium-base alloys	do	(S)	7.0	2.9
333971	Lead-base alloys	do	2.1	.2	(11)
333982	Cobalt-base alloys	do	-	-	(11)
331320	Ferrochromium	do	-	-	(11)
331313	Ferromanganese, siliconmanganese, and manganese	do			(11)
331331	Ferrosilicon (more than 8 percent silicon)	do	5.8	5.4	(11)
331309	Other ferroalloys, including silvery iron	do			(11)
	Scrap (purchased scrap only):				
190023	Iron and steel	do		3.6	.5
190020	Aluminum and aluminum-base alloy	do	366.2	75.5	96.4
190024	Copper and copper-base alloy	do			.5
144603	Sand	do	(S)	10.4	186.0
325501	Clay refractories	do	(S)	1.1	1.0
329701	Nonclay refractories	do	(S)	1.5	1.2
354401	Industrial dies, molds, jigs, and fixtures		(X)	35.4	(X)
329101	Grinding wheels and other abrasive products, except industrial diamonds		(X)	4.0	(X)
356501	Industrial patterns		(X)	5.8	(X)
362002	Electrodes		(X)	(12)	(X)
289953	Pattern wax		(X)	1.0	(X)
970099	All other materials and components, parts, containers, and supplies	(X)	12198.8	(X)	9168.5
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	139.8	(X)	116.2
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES					
	Materials, parts, containers, and supplies	(X)	263.0	(X)	240.7
331051	Pig iron, excluding silvery iron	1,000 s tons	4.2	.9	(D)
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed	do	**1.0	1.2	1.5
333405	Aluminum-base alloys	do	(S)	8.5	13.2
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.)	do	*15.2	26.3	15.9
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.)	do	(S)	94.4	*71.7
333348	Zinc and zinc-base alloys	do	1.7	1.4	1.1
333973	Magnesium and magnesium-base alloys	do	.1	.3	(D)

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
INDUSTRY 3362, BRASS, BRONZE, AND COPPER FOUNDRIES—Con.					
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.) — Con.				
333971	Lead-base alloys ----- 1,000 s tons	.2	.1	(D)	(D)
333982	Cobalt-base alloys ----- do			(D)	(D)
331320	Ferrochromium ----- do			(D)	(D)
331313	Ferromanganese, silicomanganese, and manganese ----- do			(D)	(D)
331331	Ferrosilicon (less than 8 percent silicon) ----- do			(D)	(D)
331309	Other ferroalloys, including silvery iron ----- do			(D)	(D)
	Scrap (purchased scrap only):				
190023	Iron and steel ----- do	.5	.1	(S)	1.3
190020	Aluminum and aluminum-base alloy ----- do	.5	.4	.5	.2
190024	Copper and copper-base alloy ----- do	18.6	14.8	29.5	31.7
144603	Sand ----- (S)		2.6	(S)	2.6
354402	Industrial dies, jigs, and fixtures ----- (X)		2.0	(X)	(S)
329101	Grinding wheels and other abrasive products, except industrial diamonds ----- (X)		1.5	(X)	(S)
	Industrial patterns ----- (X)		1.2	(X)	(S)
356501	Electrodes ----- (X)		(12)	(X)	(S)
362002	Pattern wax ----- (X)		.1	(X)	(S)
289953	All other materials and components, parts, containers, and supplies ----- (X)			(X)	(S)
970099	Materials, parts, containers, and supplies, n.s.k. ² ----- (X)		1236.1	(X)	928.5
971000	Materials, parts, containers, and supplies, n.s.k. ² ----- (X)		70.2	(X)	.8
INDUSTRY 3369, NONFERROUS FOUNDRIES, N.E.C.					
	Materials, parts, containers, and supplies ----- (X)		341.0	(X)	323.4
	Nonferrous metals, alloys, and ferroalloys (ingot, pig, shot, etc.):				
333404	Aluminum, unalloyed ----- 1,000 s tons	6.2	7.1	2.0	2.0
333405	Aluminum-base alloy ----- do	**15.4	13.6	19.8	19.0
333121	Copper, unalloyed (cathodes, ingot, cakes, slabs, etc.) ----- do	.2	.3	.2	.5
334123	Copper-base alloy raw materials (ingot, billets, shot, waffle, hardeners, etc.) ----- do		(S)	1.9	3.0
333348	Zinc and zinc-base alloy ----- do		(S)	120.8	147.2
333973	Magnesium and magnesium-base alloy ----- do		(S)	18.9	*9.5
331320	Ferrochromium ----- do			—	—
331313	Ferromanganese, silicomanganese, and manganese ----- do		1.8	23.3	—
331309	Other ferroalloys, including silvery iron ----- do			—	—
144603	Sand ----- (S)		.7	19.8	.5
354402	Industrial dies, molds, jigs, and fixtures ----- (X)		7.6	(X)	(S)
329101	Grinding wheels and other abrasive products, except industrial diamonds ----- (X)		.6	(X)	(S)
	Industrial patterns ----- (X)		.3	(X)	(S)
356501	Electrodes ----- (X)		(12)	(X)	(S)
362002	Pattern wax ----- (X)		.2	(X)	(S)
289953	All other materials and components, parts, containers, and supplies ----- (X)		1296.6	(X)	9126.8
970099	Materials, parts, containers, and supplies, n.s.k. ² ----- (X)		49.7	(X)	41.7

¹For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

²Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

³For 1982, material code 289953 is included with material code 970099.

⁴For 1977, material codes 333348, 333971, 333982, 354402, 329101, 362002, 289953, and 356501 were included with material code 970099.

⁵For 1977, material codes 333971, 333982, 354402, 329101, 356501, 362002, and 289953 were included with material code 970099.

⁶For 1982, material codes 354402 and 362002 are included with material code 289953.

⁷For 1982, material codes 333404, 333405, and 333973 are included with material code 970099 to avoid disclosing data for individual companies.

⁸For 1977, material codes 333971 and 333982 were included with material code 331309.

⁹For 1977, material codes 354402, 329101, 356501, 362002, and 289953 were included with material code 970099.

¹⁰For 1982, material codes 333973 and 289953 are included with material code 970099.

¹¹For 1977, material codes 333971, 333982, 331320, 331313, and 331331 were included with material code 331309.

¹²For 1982, material code 362002 is included with material code 970099.



APPENDIX A.

Explanation of Terms

This appendix is in two sections. Section 1 includes items which were requested of all establishments that were mailed census of manufactures forms including annual survey of manufactures (ASM) forms. Note that this section also includes several items (number of establishments and companies, value added, classes of products, and specialization and coverage ratios) that were not included on the report forms but were derived from information collected on the forms. Section 2 covers supplementary items that were requested only from establishments included in the ASM sample. Results of the supplementary ASM inquiries are included in tables 3c and 3d of this report.

SECTION 1. ITEMS COLLECTED OR DERIVED BASED ON ALL CENSUS OF MANUFACTURES (INCLUDING ASM) REPORT FORMS

Number of establishments and companies—As discussed in the Introduction, a separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

If the company operates at different physical locations, even if the individual locations are producing the same line of goods, a separate report was requested for each location. If the company operates in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on the number of custodial employees, capital expenditures, inventories, or any shipments from inventories during the portion of the year the plant was in operation.

In this report, data are shown for establishments in operation at any time during the year. A comparison with the number of establishments in operation at the end of the year will be provided in the Introduction to Part 1 of the General Summary subject report.

Employment and related items—The regular report forms requested separate information on production workers as of a payroll period for each quarter of the year and on other employees as of the payroll period which included the 12th of March.

All employees—This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period ending nearest the 12th of the months specified on the report form. Included are all persons on paid sick leave, paid holidays, and paid vacations during these pay periods. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November.

Production workers—This item includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

All other employees—This item covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver salespersons), sales delivery (highway truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office function, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment who are engaged in the construction of major additions or alterations to the plant and who are utilized as a separate work force.

In addition to reports sent to operating manufacturing establishments, information on employment during the payroll period which included March 12 and annual payrolls was also requested of auxiliary units (e.g., administrative offices, warehouses, and research and development laboratories) of multiestablishment companies. However, these figures are not included in the totals for individual industries shown in this report. They are included in the general summary and geographic area reports and in the final bound volumes as a separate category.

Payrolls—This item includes the gross earnings of all employees on the payroll of operating manufacturing establishments paid in the calendar year 1982. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers

of corporations, but excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payroll of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all Federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' Social Security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' supplemental labor costs, both those required by Federal and State laws and those incurred voluntarily or as part of collective bargaining agreements. (Supplemental labor costs are explained later in this appendix.)

As in the case of employment figures, the payrolls of separate auxiliary units of multiestablishment companies are not included in the totals for individual industries or industry groups.

Production-worker hours—This item covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave.

Cost of materials—This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (1) all raw materials, semifinished goods, parts, components, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (2) electric energy purchased, (3) fuels consumed for heat, power, or the generation of electricity, (4) work done by others on materials or parts furnished by manufacturing establishments (contract work), and (5) products bought and resold in the same condition. (See discussion of duplication of data below.)

Specific materials consumed—In addition to the total cost of materials, which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Information on the specific materials consumed is shown in table 7 if appropriate to the industry. Establishments consuming less than a specified amount (usually \$10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which either administrative records or short forms were used was imputed as "not specified by kind." (See the Introduction for the importance of administrative records in the industry.)

Value of shipments—This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further

processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of "all other costs" (including company overhead) and profit. (See discussion of duplication of data below.)

Individual products—As in previous censuses, data were collected for almost all industries on the quantity and value of individual products shipped. In the 1982 census program, information was collected on the output of approximately 11,000 individual product items. The term "product," as used in the census of manufactures, represents the finest level of detail for which output information was requested. Consequently, it is not necessarily synonymous with the term "product" as used in the marketing sense. In some cases it may be much more detailed and, in other cases, it is more aggregative. For example, "pharmaceutical preparations" was distributed into over 100 items; whereas, "motor gasoline" was reported as a single item.

Approximately 6,000 of the product items were listed separately on the 1982 census report forms. Data for about 5,000 products were obtained in the monthly, quarterly, or annual surveys comprising the Current Industrial Reports series of the Census Bureau. Totals for the year 1982 for these items, as derived from the commodity surveys, are shown in the "products shipped" table (table 6a) together with the tieline total value collected in the census for reconciliation purposes.

The list of products for which separate information was collected was prepared after consultation with industry and government representatives. Comparability with previous figures was given considerable weight in the selection of product categories so that comparable 1977 information is presented for most products.

Typically, both quantity and value of shipments information was collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers was also collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant was collected. Typically, the information on production was also collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

Classes of products—To summarize the product information, the separate products were aggregated into classes of products that, in turn, were grouped into all primary products of each industry. The code structure used is a seven-digit number for the

individual product, a five-digit number for the class of product, and a four-digit number for the total primary products in an industry. (See Introduction, Industry Classification of Establishments, for application of the coding structure to the assignment of SIC codes for establishments.)

In the 1982 census, the 11,000 products were grouped into approximately 1,500 separate classes on the basis of general similarity of manufacturing processes, types of materials used, and the like. However, the grouping of products was affected by the economic significance of the class and, in some cases, dissimilar products were grouped because the products were not sufficiently significant to warrant separate classes.

Duplication in cost of materials and value of shipments—The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication, since the products of some industries are used as materials by others. With some important exceptions, such as for motor vehicles and parts, this duplication is not significant at the four-digit industry level. However, it is significant at the two-digit and three-digit industry group level because these totals often include industries that represent successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the "Food" group and the addition of pulp mills to paper mills in the "Paper and Allied Products" group of industries. Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the census of manufactures.

Value added by manufacture—This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.

Because of the change in instructions for reporting inventories for 1982, the 1982 figure for value added is not strictly comparable to prior-year data. This is explained more fully in the inventories section below.

"Value added" avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

New and used capital expenditures—For establishments in operation and establishments under construction but not yet in operation, manufacturers were asked to report their new expenditures for (1) permanent additions and major alterations to manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type for which depreciation accounts were ordinarily maintained.

The totals for new expenditures exclude that portion of expenditures leased from nonmanufacturing concerns, new facilities owned by the Federal Government but operated under

contract by private companies, and plant and equipment furnished to the manufacturer by communities and nonprofit organizations. Also excluded are expenditures for used plant and equipment (although reported in the census), expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers were also requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred to the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Furthermore, if the establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported under used capital expenditures.

Total expenditures for used plant and equipment is a universe figure; i.e., it is collected on all census forms. However, the breakdown of this figure between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form and is subject to sampling error (see table 3d). The data for total new capital expenditures, new building expenditures, and new machinery expenditures, as well as the data for total used expenditures, are shown in both tables 3a and 3d. The figure in table 3a is a census universe total and may differ from the results of the ASM sample shown in table 3d. Since the figures in table 3d are subject to sampling error, they are not considered as reliable as the universe figures.

End-of-year inventories—Respondents were asked to report their 1981 and 1982 end-of-year inventories at cost or market. Effective with the 1982 Economic Censuses, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown in table 1a of this report and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown in footnote 4 of table 1a. However, the end-of-1981 figure shown in this footnote may differ from the corresponding value published as part of the 1981 Annual Survey of Manufactures.

This difference at the four-digit SIC level is due primarily to the effects of industry shifts. As described in the Industry Classification of Establishments section of the Introduction, ASM noncertainty plants are allowed to shift from one industry to another in a census year; whereas, they are "frozen" in a particular industry in ASM years. Other explanations for this difference include the effects of sampling and processing errors and revisions to end-of-1981 data reported by respondents.

In using inventory data by stage of fabrication for "all industries" and at the two-digit industry level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by another establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw

materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for individual industries, industry groups, and "all manufacturing," which are aggregates of figures reported by establishments in specified industries.

Specialization and coverage ratios—These items are not collected on the report forms but are derived from the data shown in table 5b. An establishment is classified in a particular industry if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

As noted in the Introduction, an establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary

products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). Specialization and coverage ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in tables 1a through 5a and data on product shipments shown in tables 6a through 6c.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

SECTION 2. ITEMS COLLECTED ONLY ON ASM REPORT FORMS

Supplemental labor costs—Supplemental labor costs are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Federal old age and survivors' insurance, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not specifically required by legislation whether they were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans. They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees. While the excluded items do benefit employees and all or part of their cost generally is similar to the items covered in the ASM labor costs statistics, accounting records do not generally provide reliable figures on net employee benefits of these types.

Cost of purchased services—ASM establishments were requested to provide information on the cost of purchased services for the repair of buildings and other structures, the repair of machinery, and communication services. Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property are also included. Extensive repairs or reconstruction that were capitalized are considered capital expenditures for used buildings and machinery and are, therefore, excluded from this item. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force are also excluded.

The response coverage ratio shown in table 3d for each of the three types of purchased services listed above is a measure of the extent to which respondents reported for each item. It is derived for each item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight; see section 3) for those ASM establishments that reported the

specific inquiry to the weighted total employment for all ASM establishments classified in the industry.

Electric energy used for heat and power—Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy and quantity of generated-less-sold electric energy were collected only on the ASM forms. The cost and quantity of purchased electric energy represent the amount actually used during the year for heat and power. In addition, information was collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.

Beginning- and end-of-year depreciable assets—The data encompass all fixed depreciable assets on the books of establishments at the beginning and at the end of the year. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are non-depreciable capital assets, including inventories and intangible assets, such as patent rights and royalties. Also excluded are land and depletable assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year. Accordingly, the value of assets at the end of the year includes the value of construction in progress. In addition, respondents were requested to make certain that assets at the beginning of the year plus new and used capital expenditures, less retirements, equalled assets at the end of the year.

New and used capital expenditures—The data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used capital expenditures are collected on all census forms. However, the breakdown between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. (See further explanation on capital expenditures in section 1.)

Breakdown of new capital expenditures for machinery and equipment—ASM establishments were requested to separate their capital expenditures for new machinery and equipment into (1) automobiles, trucks, etc., for highway use, (2) computers and peripheral data processing equipment, and (3) all other.

The category "automobiles, trucks, etc., for highway use" is intended to measure expenditures for vehicles designed for highway use that were acquired through a purchase or lease-purchase agreement. Vehicles normally operating off public highways (vehicles specifically designed to transport materials, property, or equipment on mining, construction, logging, and petroleum development projects) are excluded from this item.

The "not specified by kind" or n.s.k. item for expenditures for new machinery and buildings, shown in table 3d, represents the total machinery and equipment expenditures for establishments that did not break down their expenditures for the three specific categories. This means that for most industries the specific categories are understated.

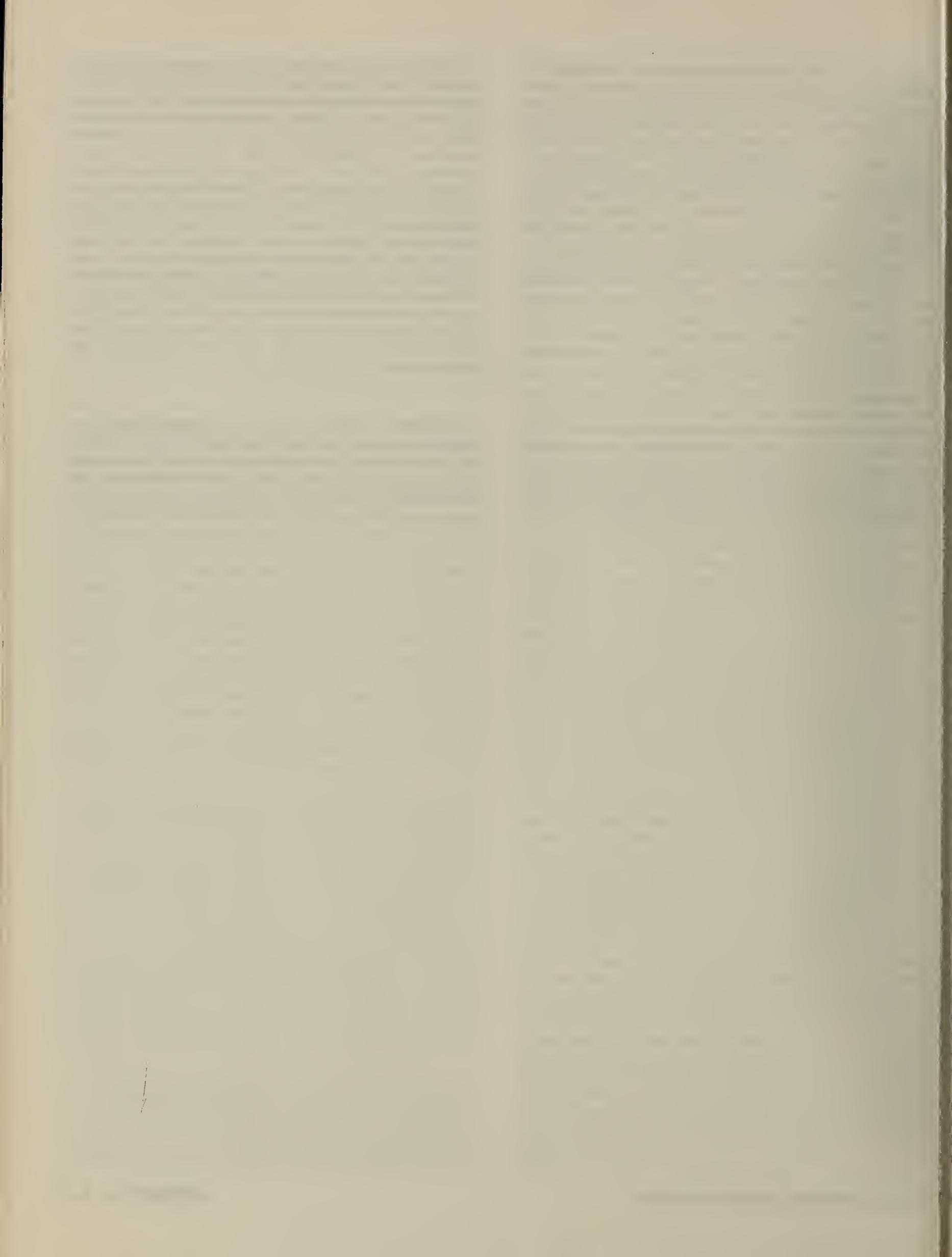
Retirements—Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during 1982. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent was also requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.

Rental payments—This item includes rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.

When an establishment of a multiestablishment company was charged rent by another part of the same company for the use of assets owned by the company, it was instructed to exclude that cost from rental payments. However, the book value (original cost) of these company-owned assets was to be reported as assets of the establishment at the end of the year.

If there were assets at an establishment rented from another company, and the rents were paid centrally by the head office of the establishment, the company was instructed to report these rental payments as if they were paid directly by the establishment.

Depreciation charges—This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.



APPENDIX B.

Annual Survey of Manufactures (ASM) Sampling and Estimating Methodologies

DESCRIPTION OF SURVEY SAMPLE

The Annual Survey of Manufactures (ASM) contains two components. The mail portion of the survey is a probability sample of about 55,000 manufacturing establishments selected from a total of about 225,000 establishments. These 225,000 establishments represent all manufacturing establishments of multiunit companies and all single-unit manufacturing establishments with five employees or more tabulated in the 1977 Census of Manufactures. This mail portion is supplemented by a Social Security Administration list of new manufacturing establishments opened after 1977. The individual establishments were defined as the sampling unit for this sample. This is a change from the previous ASM sample when companies were used as the sampling unit. The implication of this change is that the probability of selection of any establishment relates only to the size of the establishment itself and is independent of the size of the company with which the establishment is affiliated. The efficiencies associated with the change to an establishment sample have made it possible to reduce the mail sample panel from 70,000 establishments in 1978 to 55,000 establishments in the current panel.

The nonmail portion of the survey includes all single-unit establishments that were tabulated with less than five employees in the 1977 Census of Manufactures. Although this portion contained approximately 125,000 establishments, it accounted for less than 2 percent of the estimate for total value of shipments at the total manufacturing level. This portion was not sampled; rather, the data for every establishment in this group were estimated based on selected information obtained annually from the administrative records of other Federal agencies. This administrative record information, which includes payroll, total employment, industry classification, and physical location of the establishment, was obtained under special conditions, which safeguard the confidentiality of both tax and census records. Estimates for data for these small establishments were developed using industry averages in conjunction with the administrative information.

The corresponding estimates for the mail and nonmail establishments were added together, along with the adjusted base-year differences as defined in Description of Estimating Procedures below. The remaining description of the survey sample relates only to the mail portion of the ASM sample.

All establishments with 250 employees or more in the 1977 census were included in the survey panel with certainty. These establishments collectively account for approximately 65 percent of the total value of shipments for manufacturing establishments in the 1977 census. Smaller establishments were sampled with probabilities ranging from 1.000 down to 0.005 in accordance with mathematical theory for optimum allocation of a sample.

The probabilities of selection assigned to the smaller establishments were proportional to measures of size determined for each establishment. For establishments included in the 1977 Census of Manufactures, the measure of size depended directly upon each establishment's 1977 product class values and the

historic variability of the year-to-year shipments of each product class. Roughly equivalent measures of size were assigned to postcensus birth establishments based on their industry codes and anticipated payroll and employment.

The method of assigning measures of size was used in order to maximize the precision (that is, minimize the variance of estimates of the year-to-year change) in the value of product class shipments. Implicitly, it also gave weight to differences in employment, value added, and other general statistics, for these are highly correlated with value of shipments. Individual sample selection probabilities were obtained by multiplying each establishment's final measure of size by an overall sampling fraction coefficient calculated to yield a total expected sample size.

The sample selection procedure gave each establishment in the sampling frame an independent chance of selection. This method of independent selection permits the rotation of establishments into and out of a given sample panel without introducing a bias into the survey estimates.

DESCRIPTION OF ESTIMATING PROCEDURES

Most of the ASM estimates for the years 1978-1981 were computed using a modified "difference estimate" formula. For each item, a base-year difference was developed. This base-year difference is equal to the difference between the 1977 census published number for an item total and the linear ASM estimate of the total for 1977. The ASM linear estimate was obtained by multiplying each sample establishment's data by its sample weight (the reciprocal of its probability of selection) and summing the weighted values.

This base-year difference was then adjusted to reflect the estimated growth at the four-digit or, in the case of product classes, five-digit based Standard Industrial Classification (SIC) level from 1977 to the year of the survey; for example, 1981. It should be noted that due to processing constraints, the growth factors lagged one year; i.e., if 1981 is the survey year, they were not based on the estimated growth from 1977 to 1981 but rather the growth from 1977 to 1980. This one-year lag had negligible effect on the estimates, particularly at the total manufacturing level where the adjusted base-year difference accounted for less than 1 percent of the estimate for total value of shipments.

These adjusted base-year differences were then added to the corresponding current-year linear estimates, which include the sum of the estimates for the mail and nonmail establishments, to produce the estimates for the years 1978-1981. Estimates developed by this procedure usually are far more reliable than comparable linear estimates developed from the current sample data alone.

The 1982 sample data included in table 3d were also developed using difference estimates. However, since the universe totals for the census year (1977 or 1982) were not known, a modification of the procedure described above was necessary. For each item in table 3d, except purchased services and breakdown of expenditures for new machinery and equipment (see further description in appendix A, section 2), linear

estimates of the publication totals from the ASM mail sample were adjusted by the difference between imputed census totals and the corresponding ASM mail sample estimates of these imputed totals. These imputed totals are obtained by applying industry average ratios to control item values at the establishment level. For example, an imputed total beginning assets figure is obtained by multiplying each establishment's total value of shipments by the industry (four-digit SIC) average for the ratio of beginning assets to shipments.

Separate estimates for the nonmail establishments were not developed. However, their contribution to the publication estimates is reflected in the difference adjustment.

The method of inventory valuation percentages included in table 3c was developed using both complete census information and ASM estimates. The percentages for the four major categories (LIFO, non-LIFO, valuation method not reported, and LIFO reported without associated value and reserve) were derived from the complete census and correspond to the values included in table 3d. The percentages for the specific non-LIFO methods of valuations (FIFO, average cost, specific costs, etc.) are ratio estimates developed from the ASM in conjunction with the census universe estimate for the total of the non-LIFO methods.

QUALIFICATIONS OF THE DATA

The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sampled lists but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the differences between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of the estimates.

The particular sample selected for the ASM is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretical, comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected statistics in this report. Except for table 3c, they are presented in the form of relative standard errors, the standard errors divided by the estimated values to which they refer. In table 3c, "absolute" standard errors of the estimates are presented.

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete coverage value would be included in the range:

1. From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.

2. From two standard errors below to two standard errors above the derived estimate for about 19 out of 20 of all possible samples.
3. From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total and about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors would also occur if a complete canvass were to be conducted under the same conditions as the survey.

Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected in the course of the Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or only moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown.

The concept of complete coverage under the conditions prevailing for the ASM is not identical to the complete coverage of the census of manufactures, as the censuses have been conducted. Nearly all types of operational errors that affect the ASM also occur in the censuses. The ASM and the censuses, are conducted under quite different conditions, and operational errors can be better controlled in the ASM than in the censuses. As a result, for many of the census figures, the errors are of the same order of size as the total errors of the corresponding annual survey estimates. The differences between the census and ASM operating conditions also disturb, to some degree, the comparability of the ASM and census data.

Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be of limited reliability. However, the figure may be combined with higher-level totals, creating a broader aggregate, which then may be of acceptable reliability.

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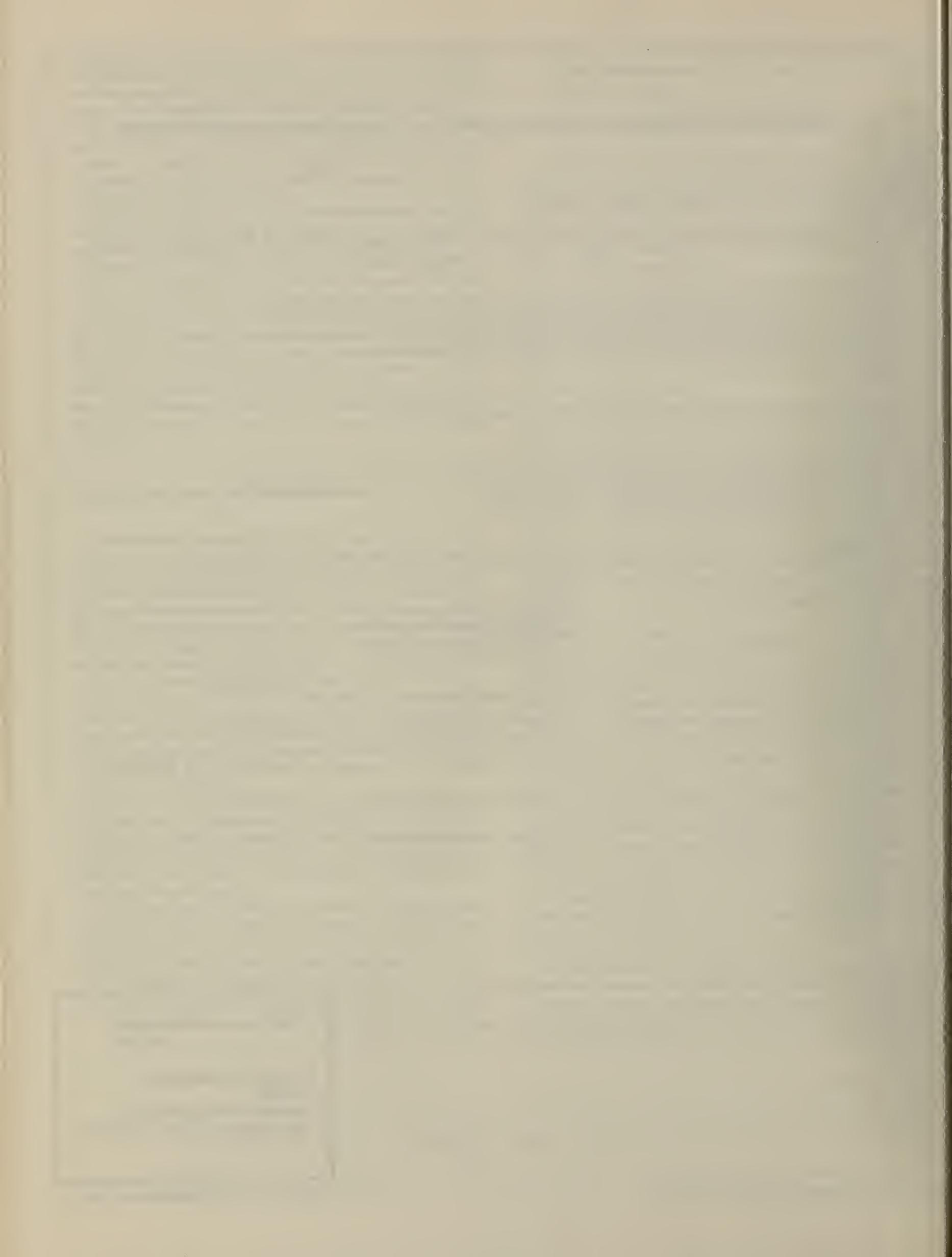
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Preliminary industry data are issued in 443 separate reports covering 452 industries (or combinations of industries). Preliminary data for States are grouped and released in reports for each of the nine census geographic divisions.

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Each of the 82 reports provides information for a group of related industries (e.g., "dairy products" includes industries for butter, cheese, milk, etc.). Final figures for the United States are shown for each of the 452 manufacturing industries on quantity and value of products shipped and materials consumed, cost of fuels and electric energy, capital expenditures, assets, rents, inventories, employment, payroll, payroll supplements, hours worked, value added by manufacture, number of establishments, and number of companies. Comparative statistics for earlier years are provided where available.

For each industry, data on value of shipments, value added by manufacturer, capital expenditures, employment, and payroll are shown by employment-size class of establishment and degree of primary product specialization. Statistics are given on production of specific products and consumption of energy and various materials by industry.

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Final paperbound reports subsequently are assembled and reissued in clothbound volumes.

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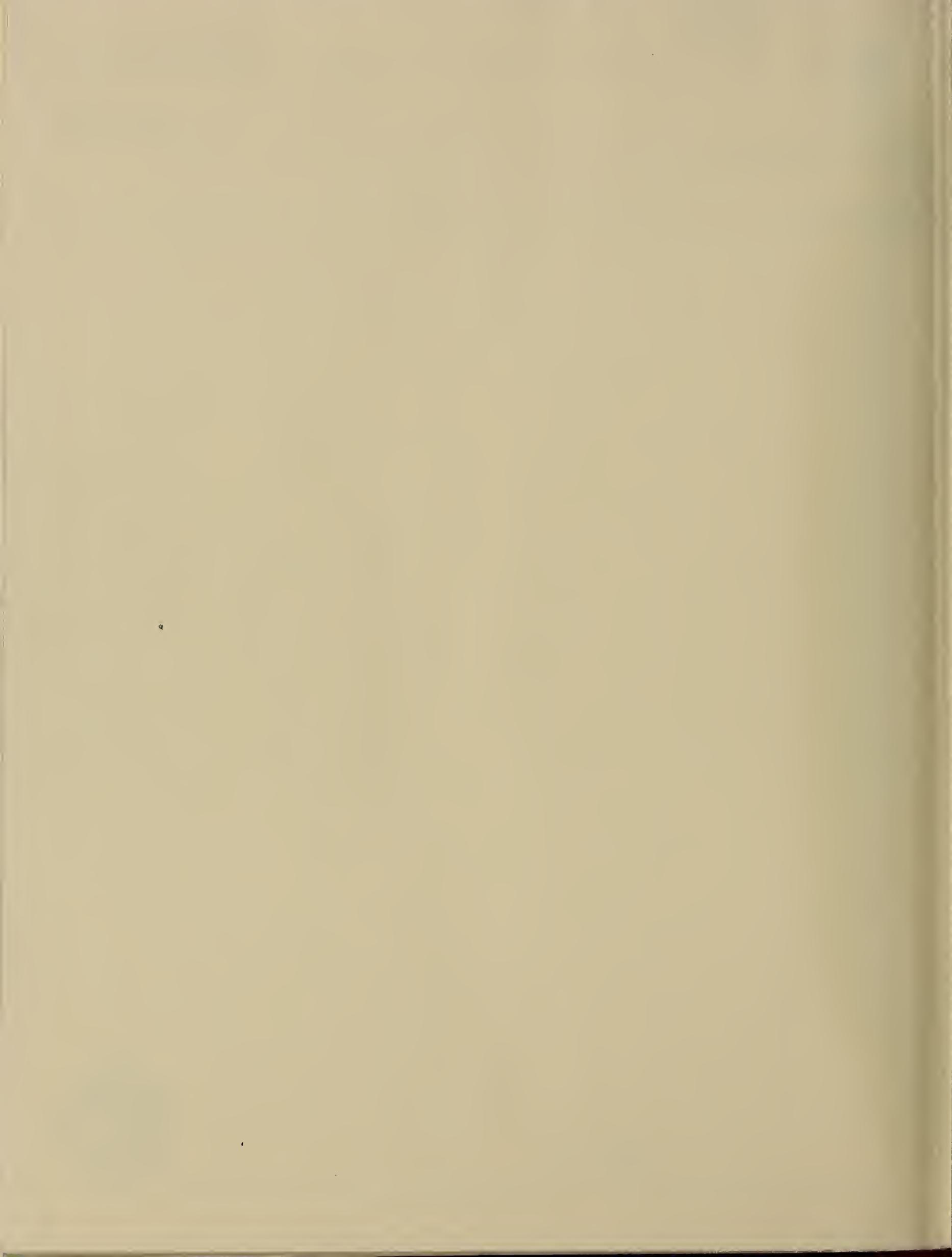
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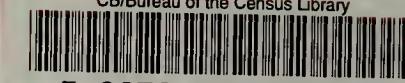




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